THE POTTERY OF POTTERY MOUND

Ceramic Surface Sampling, External Trade, and Internal Diversity

By

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Maxwell Museum Technical Series No. 22
University of New Mexico

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By

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Chapter 1

INTRODUCTION

This report describes the collection and analysis of more than 18,000 potsherds collected at the site of Pottery Mound (LA 416). The collection was made during 2009–2011 site monitoring by the Maxwell Museum of Anthropology, University of New Mexico (Phillips and Ballagh 2010, Phillips et al. 2011, 2012) in order to document the site's surface artifact inventory. This report can be seen as a continuation of my earlier ceramic studies based on material from this fascinating site (Franklin 2007, 2008, 2010b).

Pottery Mound in Space and Time

The ancient pueblo of Pottery Mound (LA 416) lies on the west bank of the meandering Rio Puerco, in central New Mexico (Eidenbach 1982; Marshall and Walt 1984). Today, the adobe walls have melted into a low mound, and part of the site has fallen into the active floodplain of the river. We can only guess how many structures comprised the town originally, but limited excavations and surface mapping indicate a substantial village with several room blocks as well as kivas and plazas (Hibben 1975, P. Schaafsma 2007). A map of the site is shown in Figure 1 (see also Phillips 2007).

Pottery Mound is well named; its abundance and variety of ceramics has intrigued archaeologists for generations. At least 35 named pottery types have been recognized, of which 30 were identified during the work described here. This abundance and variety represents a florescent local production of sherds, as well as wide-ranging trade with contemporary Puebloan towns (some still in existence). Pottery Mound's role in regional exchange is now being recognized, and this report investigates the extent of ceramic imports and their implications for regional exchange during the Pueblo IV period (A.D. 1300–1540). I also consider population movements and the cultural composition of the once-thriving town.

Based on tree-ring and radiocarbon dates, the site was occupied between AD. 1350 and 1500. Four tree-ring dates (none outer ring) span 1381–1427 (Phillips and Ballagh 2004:14). This evidence is reinforced by the pottery: the earliest types of Rio Grande Glaze Ware, Los Padillas and Arenal Glaze Polychrome, are quite rare at the site. Agua Fria Glaze-on-red, the major Glaze A type, had been produced for a couple of generations by the time major construction began at Pottery Mound. Because the site began about 1350, it is not possible to trace its founding population to the earlier inhabitants of the lower Rio Puerco, at least not directly. The area included scattered Pueblo III pit house villages as well as smaller sites such as farmsteads, but these are thought to have been deserted by 1300—half a century before major construction at Pottery Mound. If the earlier people in the immediate area have a direct connection with the site, the period of roughly 1300 to 1350 remains a mystery.

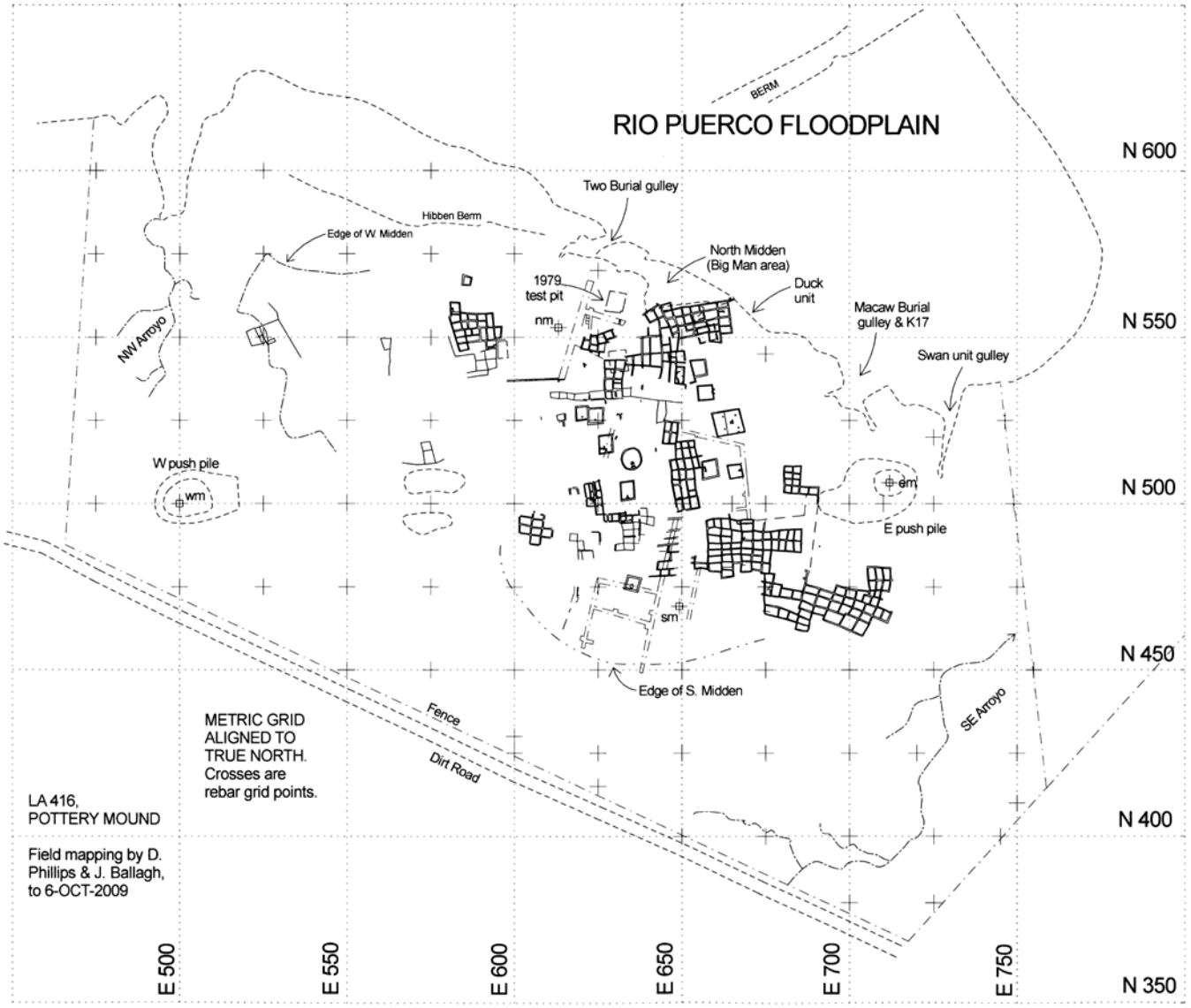

Figure 1. Pottery Mound, showing the best fit of past excavations with current map information.

The peak of occupation was between 1375 and 1450 and included the major construction, the preparation of elaborate kiva murals, and a proliferation of local glazeware styles (including Agua Fria Glaze-on-red, Cieneguilla Glaze-on-yellow, and San Clemente and Pottery Mound Glaze Polychrome), as well the site's integration into extensive trade networks. Locally, the Glaze B ceramic rim form was not produced; instead, use of the Glaze A rim style seems to have persisted through Glaze B times (C. Schaafsma 2007). As Curtis Schaafsma (2007) notes, Pottery Mound was once considered a Glaze A site only, but is now understood to extend later into the Pueblo IV period (see Franklin 2007).

The ceramic sequence continues into Glaze C times, with Kuaua and Espinoso Glaze Polychrome. Occasional rim sherds of Glaze D type (San Lazaro Glaze Polychrome) occur across the site, and may be most common at the east end. Two Glaze D sherds appeared in the uppermost levels of the 1979 stratigraphic test directed by Linda Cordell. Three radiocarbon dates from this test, run in 2007, indicate that maize cobs were being deposited in middens as late as 1470–1490 (Franklin 2008). The small amounts of locally made Glaze D pottery (San Lazaro Glaze Polychrome, 1490–1525) suggest that a remnant population was present until about 1500. Trade sherds help confirm this date range. Indeed, Glaze E (Puaray Glaze Polychrome) sherds may point to a last gasp after AD 1525. Only a handful of Glaze E sherds have ever been found, however, none *in situ*.

The preceding statement regarding Glaze D and E glaze rims is based on David Snow and Linda Cordell's examination of Harry Mera's collection from LA 416, housed at the Laboratory of Anthropology in Santa Fe (Appendix A). About 200 sherds are present, and include all of the basic types known from LA 416. Western types include Kwakina and Kechipawan Polychrome. The Rio Grande Glaze Ware sherds include 10 sherds of Espinoso Glaze Polychrome (Glaze C), 11 sherds of San Lazaro Glaze Polychrome (Glaze D), and seven sherds of Puaray Glaze Polychrome (Glaze E). The examination did not extend to a composition study, so the breakdown between locally produced versus imported sherds is unknown. However, my own examination of San Lazaro Glaze Polychrome sherds from the site indicates that in most cases, the paste and temper match those of the earlier, locally produced glazeware types.

There are tantalizing hints that the site continued in use until the Spanish Entradas. Snow (2007b) wonders whether the chronicler of the Chamuscado-Rodriguez expedition was referring to Pottery Mound when describing a side trip up a Rio Grande tributary, probably the Rio Puerco. Also, a piece of chain mail armor was allegedly discovered at Pottery Mound (B. Ellis 1956). If so, the population must have dwindled to a few families.

In summary, the site was occupied for about 150 years, from 1350 to about 1500 or slightly later. Earlier and later occupation dates are possible, but not well supported at this time.

Earlier Work

Knowledge is always built on the foundation of previous research, and this site's ceramics have caught the attention of many scholars over the years. Adolph Bandelier visited the site in 1883, and remarked on the "brilliant display" of pottery (Lange and Riley 1970:26). H. P. Mera

(1940:18) stated, “Sherds of three different cultures are present in such quantities that it makes this village unique in the Rio Grande drainage.” In the 1950s and early 1960s, Frank Hibben of the University of New Mexico directed four field schools at the site, and followed up with an excavation program funded by the National Science Foundation. Hibben’s book on Pottery Mound’s kiva murals (1975), along with several brief articles, led to the realization that the site was unusual. It is tempting to conclude that Pottery Mound was an entrepôt, both commercial and spiritual, between the eastern and western Pueblo worlds.

Unfortunately, the Hibben era collections suffer from various problems. There was no attempt to sample all areas of the site evenly; selection of work areas seems to have been arbitrary. The maps of those work areas were not effectively tied to permanent datums or to each other. Screening for artifacts was almost unknown, and many items were discarded after being typed or described. For objects that did make it into storage boxes, curation methods were inconsistent. While Hibben’s kiva mural book is a visual treat, he never converted his field notes and maps into a general excavation report.

Fortunately, two M.A. candidates produced useful ceramic studies based on Hibben’s work. Voll (1961) described pottery types and their frequencies, and Brody (1964) described design motifs. Much later, Betty Garrett (1976) and Helene Warren (1982) studied the composition of pottery in and around the site.

The first modern excavation at the site was a 1979 stratigraphic test pit in what is now known as the North Midden, as part of a field school under the direction of Linda Cordell (1980a; Cordell et. al. 2008). This unit measured 5 by 5 m and was excavated to the earliest levels in the midden. Detailed stratigraphic profiles were drawn, and all artifacts and related materials were carefully provenienced. The ceramics from this unit have been analyzed and reported by Eckert (2003, 2007, 2008) and Franklin (2007, 2010b).

In 2007, several scholars (some of whom had worked at Pottery Mound as students) published a summary volume on what was then known about Pottery Mound (P. Schaafsma 2007). A year earlier, David Phillips had begun a volunteer-driven program of site monitoring and “archival archaeology” in an attempt to make sense of the collections at the Maxwell Museum. My own work stems from that revived effort; it has focused on ceramic taxonomy, type frequencies, paste and temper materials, and trade/exchange (Franklin 2007, 2008, 2010b).

Goals of this Project

Linda Cordell’s 1979 field efforts included a sample of the surface artifacts at Pottery mound, and the sherds from the sample are currently being studied by Suzanne Eckert. In 2009 and 2010 we opted to collect a limited second surface sample (see Phillips and Ballagh 2010; Phillips et al. 2011), for two reasons. First, the 1979 sample was based on random selections of distance and bearing from a fixed point, and it would be useful to obtain a sample based on a different approach (in this case, a systematic sample at 25 meter intervals over a Cartesian grid). Second, it was evident that the surface assemblage at the site was being degraded through illegal

collecting, and collections from two points in time, roughly 30 years apart, would assist in assessing the nature and rate of loss over time.

We were also concerned with being able to compare remains from all three obvious middens at the site: North, South, and West (to the east of the room blocks, trash deposits are present but deeply buried). Cordell's 1979 stratigraphic test provided an outstanding sample of the North Midden contents. Hibben trenched the South Midden but most of those materials were either not collected or have disappeared, and apparently he never examined the West Midden deposits, so prior to the monitoring project only one of the three obvious middens was adequately reflected in collections. We therefore surface collected 100 units, each 1 by 1 m, in the West and South Middens in 2010 and 2011 (Phillips et al. 2011, 2012). During both the systematic sample and the midden collection, all material types were collected, not just sherds, and those additional materials are available for study.

In analyzing the 2009–2011 surface collections, I hoped to identify spatial variations in ceramic categories across the site, as an indicator of unequal deposition and, by implication, unequal use. More specifically, I sought evidence of non-random distributions of painted versus utility ware, and of certain pottery types (including non-local ones). The analysis of the 18,224 sherds from the surface collection has allowed me to address these research issues, at least in part.

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Chapter 2

FIELD METHODS

The surface collection program took place in three phases: (1) a systematic sample of the entire site surface, (2) two sample transects on the west midden, and (3) two sample transects on the south midden (Figure 2). Collecting boundaries were set along the metric grid set up by Phillips and Ballagh; where topography allows, this grid includes rebar grid points usually set at 25 m intervals, within the boundary fence that encloses the surviving portion of the site.

An additional, point-provenienced sample of Hopi sherds was collected by Dave Phillips. The preliminary results of that study, including a list of the sherds, are included as Appendix B.

Systematic Sample

The systematic surface sample was based on 1 by 1 m collection units, spaced every 25 m north-south and east-west, with a few exceptions where terrain or other considerations prevented a regular distribution of rebar grid points. The units were aligned to the site grid and utilized the rebar points as the northeast corners of the units. If artifacts were present at that grid interval, all of them were collected, along with all other cultural remains such as adobe and charcoal fragments. Items were bagged by artifact category, and inventoried immediately. A field specimen (FS) list was filled out as each bag was collected, including date, type of material, FS number, grid number, and comments. After each day's activities, the field data were entered into an Excel spreadsheet.

The collection units were at the following locations. Any unit not mentioned was beyond the surface artifact scatter, or did not contain any artifacts.

Along the E 500 line, units were collected at N 525 (G-9), N 550 (G-8), and N 575 (G-7). N 500, on the west bulldozer push pile, was not examined.

Along the E 525 line, units were collected at N 525 (G-4), N 550 (G-1), N 575 (G-5), and N 600 (G-6).

Along the E 500 line, units were collected at N 500 (G-15), N 525 (G-3), N 550 (G-2), and N 575 (G-10).

Along the E 575 line, units were collected at N 475 (G-16), N 500 (G-14), N 525 (G-13), N 550 (G-12), and N 575 (G-11).

Along the E 600 line, units were collected at N 475 (G-17), N 500 (G-18), N 525 (G-19), and N 575 (G-20). No artifacts were found at N 550.

Along the E 625 line, units were collected at N 415 (G-24; just inside the site fence), N 450 (G-23), N 475 (G-22), and N 570 (G-21; edge of the terrace surface). No artifacts were found at N 425, N 5500, N 525, or N 550.

Along the E 650 line, units were collected at N 450 (G-25), N 475 (G-26), N 525 (G-27), and N 550 (G-28). No artifacts were found at N 500.

Along the E 675 line, units were collected at N 400 (G-34), N 425 (G-33), N 450 (G-32), N 475 (G-31), N 525 (G30), and N 545 (G-29; edge of the terrace surface). No artifacts were found at N 500.

Along the E 700 line, units were collected at N 450 (G-35), N 475 (G-36), N 500 (G-37), and N 525 (G-38).

Along the E 725 line, units were collected at N 500 (G-40) and N 520 (G-39; edge of the terrace surface).

In all, 40 units included artifacts and were collected (Figure 2). In a statistical sense, the sample was larger than 40—but empty units are not considered in this study. Because the units were small, the resulting systematic sample of the surface remains was also small—but this was a monitoring project, and our goal was to minimize the impact to the surface assemblage when collecting information. After all, a surface sample already existed, having been collected in 1979.

Midden Sample Transects

The second phase of work sampled the extensive midden on the west side of the site, usually referred to as the West Midden. This midden appears to be fairly shallow, compared to the North and South Middens, but no one has ever tested the midden to find out. Two parallel transects were laid out, 25 m apart, extending east-west along grid lines. Each transect was 25 m long and 1 m wide, resulting in 50 sample units each measuring 1 by 1 m. The southern transect extended from E 550 to E 575 and from N 525 to N 526. The northern transect extended from E 550 to E 575 and from N 550 to N 551.

The third phase of work was similar to that of the second phase, but took place but on the south side of the site. Here, what is known as the South Midden slopes southward from what was once the highest portion of the mound. Hibben trenched the midden in the 1950s but there are few records about the work and most of the remains (other than human remains) were discarded, so a new sample of the midden was needed. Two parallel transects were laid out, 25 meters apart, extending north-south along grid lines, avoiding the still-visible scars left by Hibben's trenches. In this area as well, each transect was 25 m long and 1 m wide, resulting in 50 sample units each measuring 1 by 1 m. The west transect extended from N 450 to N 475 and from E 625 to E 626. The east transect extended from N 450 to N 475 and from E 650 to E 651.

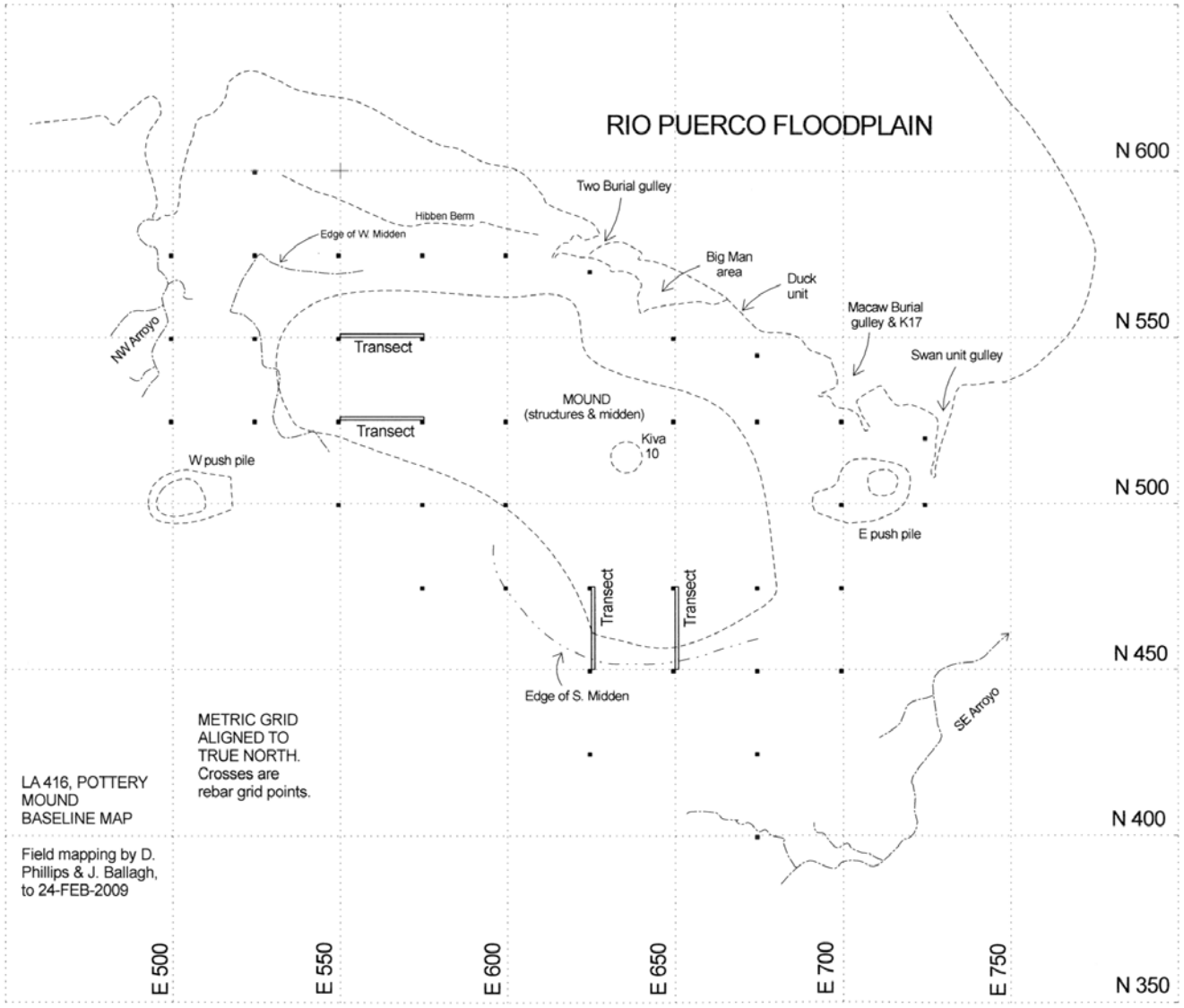

Figure 2. Locations of systematic sample units with surface artifacts (black squares), and of transects.

Thus, the west and south middens were collected sufficiently—50 units in each—to reveal any major differences between them, and between those midden areas and the whole-site sample recorded during the first phase of work. The three phases of work resulted in collection of 18,224 sherds from a total of 140 square meters. Figures 3–5 show field activities related to site mapping and surface collection.

Figure 3. Dave Phillips and students during early mapping at Pottery Mound.

Figure 4. Leslie Cohen and Janice Daigh collecting from a transect on the South Midden.

Figure 5. Leslie Cohen collecting from a transect on the West Midden.

Thoughts on Surface Conditions

Hayward H. Franklin and David A. Phillips, Jr.

At times, a collection unit contained scores of artifacts while an equivalent surface a meter or two away contained no artifacts at all. We also saw instances where a collection unit yielded few or no artifacts, while just outside the unit there were hundreds to be seen. This variability, which conditioned our approach to interpreting the collection results, appeared to be due to both natural and cultural alterations.

Erosion has been especially severe in the north part of the site, where it sits on an 11 m tall escarpment of soft alluvium. Below is the active floodplain of the Rio Puerco, which has chewed away part of the site. In the northwest part of the site, especially, sheet erosion is encouraged by soil piping. North of the protective berm placed by Frank Hibben (Figure 1), the ground surface next to the escarpment looks like a moonscape. Any surface artifacts from that part of the site are long gone. In most of the rest of the site, however, sheet wash has been more moderate, and it is

doubtful that water has moved surface artifacts more than a few meters. Examination of the grid points established during the monitoring project reinforced our sense that over much of the site, surface erosion is a slow process. The northwest and southeast edges of the site have been cut by arroyos, which contain artifacts that in some cases have been moved great distances. However, none of the surface collections described in this report included artifacts within arroyos.

The site's plant cover—mostly low bushes—has also affected surface assemblage visibility. In some cases, the ground can't be seen. In others, leaf litter and windblown sand have accumulated, hiding artifacts. However, such effects occur randomly across the site, so no one sector of the surface is more or less visible than any other.

The major source of cultural alterations to the site surface was the excavations that began at in 1954 and continued as late as 1989. These transformed Pottery Mound from a smooth, gentle rise to a more bumpy terrain. However, the backdirt areas that are evident on the site itself appear to be from adjacent excavations—not farther away than a shovel can throw dirt. For units close to the Rio Puerco, wheelbarrows of backdirt were dumped off the escarpment, onto the floodplain below (so that backdirt did not alter the surface assemblage). The fill from the large bulldozer trench through the site was pushed into two large piles that are still evident today, and the systematic sample did not include those two "push piles."

After 1961, sustained fieldwork ended at Pottery Mound; Frank Hibben's subsequent "salvage" digs were concentrated along the escarpment, including at places that have since fallen away.

A second cultural alteration is illegal collecting. During the monitoring program, direct evidence of such collecting included small piles of artifacts (the items discarded by collectors) and one eyewitness account from a ranch hand. It is not clear how much illegal collecting has taken place (one reason to have two samples of the surface assemblage, obtained three decades apart) but, fortunately, the surface assemblage at Pottery Mound is unusually rich even after a loss of some sherds to collectors. On most sites, illegal digging is a more serious concern but, fortunately, not at Pottery Mound, thanks to its distance from public roads. During the monitoring program we noted just a few small areas of limited and incompetent subsurface digging. Fortunately, the site has been protected over the years, with recent professional activity largely confined to mapping the site surface and the collecting described in this report.

In summary, the surface of Pottery Mound is about as pristine as at other sites—meaning that it is not pristine at all. Nonetheless, archaeologists repeatedly extract useful information from surface artifact patterns even though every surface assemblage has undergone natural or cultural transformations (or both), and never is a "flypaper" record of prehistoric behavior. On a large habitation site occupied for multiple generations, the inhabitants themselves contributed to the distortions. At Pottery Mound in particular, factors such as erosion, plant cover, excavation, and illegal collecting are all reasons to avoid conclusions based directly on the fine-grained structure of the surface assemblage. Instead we did not sample areas of obvious disturbance and looked for broad trends in the resulting data. In a sense, most site surfaces are like an impressionistic painting. Looking closely, one sees seemingly random or even misleading daubs of information. By stepping back, one sees a picture that, with suitable caution, can be interpreted.

Chapter 3

CERAMIC ANALYSIS

The surface collection pottery collection includes 18,224 fragments of pottery; no whole or restorable vessels were found. Each bag was analyzed separately, and all potsherds at least 1 cm across were recorded. Each fragment was clipped on an edge to reveal a cross section, and was then examined under a binocular microscope at 10 to 30 power. Pottery type, temper, vessel form attributes, and vessel part were marked on the analysis form. Oxidation tests were not conducted, as a more complete analysis of ceramic pastes and tempering materials was completed earlier (Franklin 2010b). All data were entered into Excel spreadsheets. The analysis forms can be found in Appendices C and D.

Pottery types and varieties were recorded with the aid of a type list, which was little changed from the ones used my previous analyses of Pottery Mound ceramics. During this study some minor variations at the level of sub-types or varieties were ignored, because we already have abundant information about minor variants from previous analyses (Eckert 2003; Franklin 2007). Thus, San Clemente Glaze Polychrome was not divided into varieties based on slip location on the vessel, and Pottery Mound Glaze Polychrome was not divided based on slip or paint color.

Actual type names (e.g., Agua Fria Glaze-on-red) were only assigned when there was secure evidence that the type assignment was justified. In the case of Rio Grande Glaze Ware, this means having a rim sherd; the ware and its constituent sequential types (Glaze A thru F) were defined on combinations of design styles and rim forms. Without the diagnostic rims, similarities in painted designs fail to provide exact identifications. To provide one example, identification of Glaze C versus Glaze D requires a rim sherd, as the painted decoration is so similar. In this study, non-rim sherds were classed into groups based on painted styles (including sherds that were slipped but not painted). Although such Rio Grande Glaze Ware body sherds cannot be assigned to types, they make up part of the sherd counts for the ware as a whole. At least some information can be gained from quantities of red-slipped, red-and-white-slipped, etc. body sherds within general counts.

For other pottery types, a similarly cautious approach was used. A painted Hopi sherd might be identified as Sikyatki Polychrome, for example, but an unpainted sherd from a vessel of that type might only be identifiable as “unpainted Hopi yellow ware.”

The microscopic examination of each sherd was essential. This step allows a careful examination of tempering materials, and also leads to the secure identification of certain types based on paste composition. The most obvious case in point is the painted and utility wares from the Acoma-Zuni area. On their surfaces, the sherds from that area may resemble those made at Pottery Mound, but the Acoma-Zuni sherds differ significantly when both paste and temper are examined. For similar-looking pottery types and wares, basic source-area and culture-area differences simply cannot be determined reliably without the microscopic identification of pastes and tempers.

Ceramic Types

A great variety of pottery has been identified at Pottery Mound, including at least 38 named types (Franklin 2007). As Table 1 shows, most of these types were also identified in the surface collection. Their frequencies are shown in Table 2, which also breaks down types by temper.

The glazeware and other types made at or brought to Pottery Mound are described in detail in previous studies (Eighth Southwestern Ceramic Seminar 1966; Franklin 2007; Mera 1933; P. Schaafsma 2007; Snow 1982; Warren 1979; Wilson 2007). A comprehensive summary can be found in Thomas Morales' dissertation (1997), and Oppelt (2007) has compiled date spans. Summaries of their main characteristics will be provided below, together with comments arising from my study of the surface collection. Figures 6 and 7 illustrate the varied rim profiles of the glazeware sequence.

Rio Grande Glaze Ware

Glaze A (A.D. 1300–1425) evolved from ceramics of the late northern Mogollon peoples of the Little Colorado district. Made along the Rio Grande, Glaze A vessels initially maintained the red slips, black mineral paint, and white exterior designs of its predecessors, especially the widely traded St. Johns Polychrome. Glaze A bowls have straight rims with round or flattened lips. The vessels were created at the new large towns along the Rio Grande and its tributaries, in a plethora of styles including Agua Fria Glaze-on-red and Los Padillas, Arenal, San Clemente, and Pottery Mound Glaze Polychrome. South of Albuquerque, these styles are more contemporary than sequential. Glaze-on-red pottery, in particular, had a long time span.

Glaze B times (A.D. 1425–1450) were exemplified by Largo Glaze-on-red, Glaze-on-yellow, and Glaze Polychrome. Lasting only about 25 years, the Largo series saw the first regional experiments with more elaborate bowl rims; those became thickened and sometimes bulbous at the ends. This development never took root in the southern part of the glazeware production area; only a few such rims have been found at Pottery Mound. It appears that in the Albuquerque area southward, production of bowls with Glaze A rims continued unabated. In the 1979 stratigraphic test at Pottery Mound, straight rims with rounded or angled lips dominated the early part of the deposition sequence but continued to be found in the uppermost layers (Franklin 2007).

In the literature, *Glaze C* (A.D. 1450–1500) is typified by thickened, lozenge-shaped rims. These rims varied considerably in shape, probably more than at any other time during the sequence. Some rims are shaped like golf-clubs while others are more elongated; some have a flattened bevel at the lip. At least some of this variation in rim and lip shape is due to regional variations in glazeware production. The "classic" Glaze C type, Espinoso Glaze Polychrome, was codified by Mera (1933) and the Eighth Southwestern Ceramic Seminar (1966) as having an elongated club-shaped or ovoid rim profile. However, this type proved to be more typical in the northern range of Glaze C, in the Galisteo Basin and Santa Fe area.

Table 1. Major Pottery Types and their Dates.
Based on Oppelt (2007) and Wilson (2007).

Type	Date Range
Indigenous Types (Made at Pottery Mound)	
Agua Fria Glaze-on-red	1315–1425
Cieneguilla Glaze-on-yellow	1325–1425
Cieneguilla Glaze Polychrome	1325–1425
San Clemente Glaze Polychrome	1325–1450
Pottery Mound Glaze Polychrome	1400–1490?
Kuaua Glaze Polychrome	1425–1500?
Rio Grande plain gray utility	1300–1600
Types from the Middle Rio Grande Region	
Developmental period:	
Los Lunas Smudged	1200–1325?
Socorro Black-on-white	1050–1300
Clapboard corrugated	1050–1250?
Indented corrugated	1200–1325?
Glaze A (Middle Rio Grande):	
Los Padillas Glaze Polychrome	1300–1325?
Arenal Glaze Polychrome	1325–1350?
Glaze B (Galisteo Basin):	
Largo Glaze-on-yellow	1400–1450
Largo Glaze-on-red	1400–1450
Glaze C (Middle Rio Grande):	
Espinoso Glaze Polychrome	1425–1500
Glaze D (Middle Rio Grande):	
San Lazaro Glaze Polychrome	1470–1525?
Intrusive Types from the Northern Rio Grande Region	
Bandelier–Tewa area:	
Biscuit A	1375–1450
Biscuit B	1400–1550
Rio Chama:	
Sapawe Micaceous	1400–1500?
Potsuwii Incised	1400–1500?
Intrusive Types from the Western Pueblo Region	
White Mountain Red Ware:	
St. Johns Polychrome	1150–1300
Heshotauthla Polychrome	1275–1400
Acoma-Zuni area:	
Kwakina Polychrome	1275–1425
Pinnawa Polychrome	1375–1450
Kechipawan Polychrome	1375–1475
Hopi Area:	
Jeddito Black-on-yellow	1350–1450
Sikyatki Polychrome	1400–1625

Table 2. Pottery Types by Temper.

Type Code	Temper Type	Sherd	Red/black basalt	Quartz sand	Diabasic basalt	Horn-blende latite	Mica or schist	Tuff	Total
	Pottery Type Temper Code	**1**	**4**	**6**	**8**	**9**	**10**	**14**	
Rio Grande Glaze Ware body sherds, no paint									
91	Ext. and int. red or orange (probably Agua Fria Glaze-on-red)	9	2584	27	2391	20			5031
93	Ext. red, int. white or vice versa (probably San Clemente Glaze Polychrome)		90		75	3			168
97	Red or orange slip, glaze paint (probably Agua Fria Glaze-on-red)	1	1049	2	961	6			2019
98	Ext. red, int. white, or vice versa (probably San Clemente Glaze Polychrome)	4	595		478	7			1084
99	Polychrome with glaze paint (probably Pottery Mound Polychrome)		8		4				12
101	Los Padillas Polychrome (sherd temper)	2							2
105	Arenal Polychrome (rock temper)		1		1				2
110	Agua Fria Glaze-on-red (incl. orange slip)	1	246	2	244				493
116	San Clemente Glaze polychrome (including varieties under codes 115–119)	1	106		101				208
120	Cieneguilla Glaze-on-yellow		1		3				4
121	Cieneguilla Polychrome		1						1
125	Pottery Mound Polychrome (including varieties under codes 125–127)		93		49				142
Glaze C									
301	Espinoso Polychrome					8			8
302	Kuaua Polychrome		31		15				46
Glaze D									
401	San Lazaro Polychrome		1		1	1			3
	Subtotal	18	4806	31	4323	45	0	0	9223
	Percent	0.2%	52.1%	0.3%	46.9%	0.5%	0.0%	0.0%	100.0%

Table 2. Pottery Types by Temper.

Type Code	Temper Type	Sherd	Red/black basalt	Quartz sand	Diabasic basalt	Horn-blende latite	Mica or schist	Tuff	Total
	Pottery Type Temper Code	**1**	**4**	**6**	**8**	**9**	**10**	**14**	
Other Painted Types									
9	Plain white (from black-on-white vessel)	1		2					3
12	Socorro Black-on-white	15	3	1	1				20
15	Santa Fe Black-on-white	1							1
25	Biscuit A (Abiquiu Black-on-gray)			1				1	2
30	Biscuit B (Bandelier Black-on-gray)							2	2
50	St. Johns Polychrome	4							4
55	Heshotauthla Polychrome	3							3
	Subtotal	24	3	4	1	0	0	3	35
	Percent	68.6%	8.6%	11.4%	2.9%	0.0%	0.0%	8.6%	100.0%
Rio Grande Utility Wares									
701	Clapboard corrugated (exposed coils)	1	17	4	5		17		44
705	Indented corrugated (indentations without wiping)	6	67	13	8		16		110
710	Plain surface (indentations completely obliterated)	6	6122	115	1088		388		7719
725	Los Lunas Smudged				2				2
726	Pitoche Ribbed	1					1		2
	Subtotal	14	6206	132	1103	0	422	0	7877
	Percent	0.2%	78.8%	1.7%	14.0%	0.0%	5.4%	0.0%	100.0%
Acoma-Zuni Area Wares									
810	Kwakina Polychrome	107	4	1		2			114
820	Pinnawa Polychrome	72	5						77
821	Kechipawan Polychrome	6							6
830	Generic Acoma-Zuni painted	101	11	2	1				115

Table 2. Pottery Types by Temper.

Type Code	Temper Type	Sherd	Red/black basalt	Quartz sand	Diabasic basalt	Horn-blende latite	Mica or schist	Tuff	Total
	Pottery Type Temper Code	**1**	**4**	**6**	**8**	**9**	**10**	**14**	
831	Undecorated portions of Acoma-Zuni painted	91	4						95
740	Cibola-Acoma-Zuni plain utility	137	307	3			2		449
741	Cibola-Acoma-Zuni corrugated utility	32	34	4					70
	Subtotal	546	365	10	1	2	2	0	926
	Percent:	59.0%	39.4%	1.1%	0.1%	0.2%	0.2%	0.0%	100.0%
Hopi and Hopi/Acoma Wares									
850	Jeddito Black-on-yellow	5		13					18
860	Sikyatki Polychrome	1		6					7
870	Generic Hopi yellow ware	8	1	50					59
880	Hopi utility ware, plain surface	4		12					16
881	Hopi utility ware, corrugated surface			14					14
885	Hopi or Acoma plain utility	11		22					33
886	Hopi or Acoma corrugated utility	3		10					13
	Subtotal	32	1	127	0	0	0	0	160
	Percent	20.0%	0.6%	79.4%	0.0%	0.0%	0.0%	0.0%	100.0%
999	Unknown	2			1				3
	Grand Total	636	11381	304	5429	47	424	3	18224

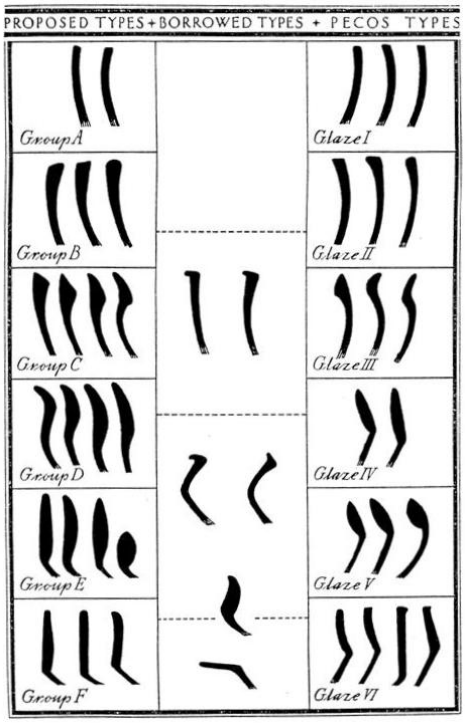

Figure 6. Glaze ware rims, according to Mera (1933). Reprinted by permission of the Museum of New Mexico.

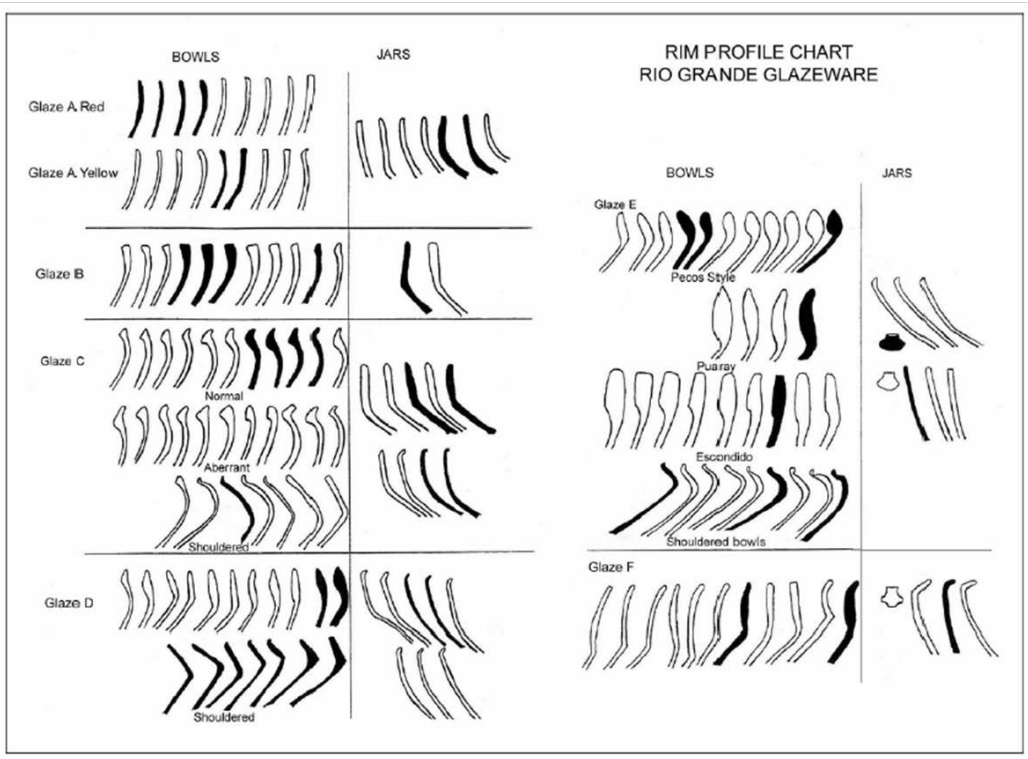

Figure 7. Glazeware bowl rim form variations, from McKenna and Miles (1996). Reprinted by permission of Peter McKenna.

Farther south, Glaze C production took a different form. The existence of local variation was already surmised by Mera (1933), who noted the presence of incurved bowl rims with angled or beveled lips in the Albuquerque area. The name "Kuaua Polychrome" was attached to these rims, formalizing the contrast with the "classic" Espinoso Glaze Polychrome profiles from the northern portion of the Glaze C range.

A distinct local version of Glaze C rims did not involve the thickening of the upper rim into the "lozenge" shape. Instead the lips became strongly inwardly beveled, and at times had a "tang" on the exterior lip edge. At the same time, bowl sides began curving inward, sometimes markedly so. The result was a profile illustrated by Mera (Figure 6, middle column) and other rim form diagrams since then (Figure 7). The degree of incurving of the bowl rim varied among potters, but the "Kuaua" vessel form always involved some degree of inward curvature. In extreme cases, the curvature left little visible interior surface to decorate, and many interiors were slipped and polished only (i.e., painted decorations were confined to the bowl exterior). "Kuaua" bowl decorations are typically in San Clemente style with its contrasting slips, or in Pottery Mound style with its multiple slip and painted colors. Thus, "Kuaua" is just a later vessel form within these other decoration-based named types.

The 17 levels of the 1979 stratigraphic test yielded 138 Kuaua rims. Such rims were nonexistent below Level 10 but were close to a tenth of the glaze rims by Levels 2–4 near the top of the deposits (Franklin 2007, Table 7). Thus, the changes in rim form postulated by Mera (1933) are confirmed by the test unit data from Pottery Mound. These also explain why so little Espinoso Glaze Polychrome is found at the site; Espinoso was made elsewhere, mostly in the Galisteo-Santa Fe area, while Kuaua took its place in the south.

Stylistically, the local San Lazaro Glaze Polychrome of *Glaze D* times (A.D. 1480–1525) conforms closely to the standard descriptions of the type in the Galisteo Basin and Santa Fe areas. The elongated and thickened rim profile and red painted frets outlined in black glaze paint are typical in both areas. Locally produced glazeware vessels lost their distinctive local qualities, becoming more "generic." Almost all of the Glaze D pottery examined at Pottery Mound has local red paste and basalt temper, however, demonstrating continued local ceramic production into Glaze D times (Franklin 2010b).

Black-on-white Pottery

Black-on-white pottery is not common anywhere at Pottery Mound, and none appears to have been made at the site. Instead, production of black-on-white pottery is supposed to have ended about 1300, before Pottery Mound was founded. Within this category the most common type is Socorro Black-on-white (Wilson 2007), which was made at the many late Pueblo III (Coalition) period villages that dot the Lower Rio Puerco valley (Eidenbach 1982; Fenenga and Cummings 1956). The persistent appearance of small amounts of Socorro Black-on-white suggests that Pottery Mound was built on top of, or at least near, a Pueblo III village. Santa Fe Black-on-white, another Pueblo III type, commonly occurs together with Socorro Black-on-white in the Albuquerque area, but it is locally rare west of the Rio Grande valley.

Other pottery in the black-on-white tradition includes Biscuit Ware (Abiquiu and Bandelier "Black-on-gray"), made on the Pajarito Plateau and along the lower Rio Chama. Small amounts of Biscuit Ware appear as intrusive sherds in the Pottery Mound collections.

White Mountain Red Ware

The Pottery Mound assemblages include consistent small amounts of late White Mountain Red Ware pottery, which was made in late Pueblo III period villages along the Little Colorado and its tributaries (Carlson 1970). St. Johns Polychrome was one of the most widely traded types in the Southwest, and must have had some special appeal outside its production area. In the vicinity of Pottery Mound, St. Johns is a recurring intrusive type in Pueblo III sites. White Mountain Red Ware is also important as the inspiration for glazeware production in the middle Rio Grande region after 1300. Specifically, St. Johns and Heshotauthla Polychrome were used before, and inspired, Los Padillas and Arenal Polychromes.

Utility Wares

During the Pueblo IV period, utility vessels underwent a stylistic evolution from exposed and sometimes indented ("corrugated") coils to increasingly wiped over ("obliterated") coils and then to plain surfaces. The transition is seen in the surface collection, which includes clapboard and indented corrugated styles along with the later and more frequent plain-surfaced sherds. Also, utility ware bowls, formerly almost unknown, make an appearance. Small numbers of utility ware bowl rims appear in collections from Pottery Mound and from Chamisal and other contemporary sites along the Rio Grande. Another change was the increased use of intentional smudging and stone polishing on vessel interiors, including bowl interiors and the insides of jars near the rims. Use of the bowl form and increased smudging held over into historic times; ultimately, they gave rise to the smudged and polished black wares of certain modern Pueblo potters.

The increased use of smudging and other aspects of utility ware bowls may reflect the artistic influence of northern Mogollon towns. This influence was felt locally during Pueblo III times; pit house settlements along the Rio Grande and along the lower Rio Puerco include smudged but unpainted bowls (Los Lunas Smudged). The same sites yield corrugated or plain utility pottery of the Pitoche series, along with Socorro Black-on-white. Recent studies suggest that this mix of pottery was produced from local materials. The juxtaposition of the black-on-white painted tradition with smudged and polished bowls is an interesting phenomenon and deserves further study. Their occasional appearance at Pottery Mound echoes the minor presence of Socorro Black-on-white; like that type, they are an intriguing anachronism for a site presumably not founded before A.D. 1350.

Western Glaze Wares and Utility types

One concern of my studies of Pottery Mound pottery was a wish to better document the pottery types from the late prehistoric towns in the vicinity of modern Acoma and Zuni. The pottery of the Acoma-Zuni area has been defined by Harlow (1965), Huntley (2008), the Seventh Southwestern Ceramic Seminar (1965), and Woodbury and Woodbury (1966). At Pottery Mound

the relevant types include Kwakina Polychrome (A.D. 1285–1380), Pinnawa Glaze-on-white (A.D. 1350–1450), and Kechipawan Polychrome (A.D. 1375–1475) (dates from Oppelt 2007). These dates effectively bracket the presumed occupation span at Pottery Mound (A.D. 1350–1500). At the time, glaze wares were made at various locations in the Acoma-Zuni areas, but the source areas cannot be distinguished on typological grounds alone (especially at Pottery Mound where the sherds appear in a trade context). The term "Acoma-Zuni" identifies the western New Mexico sherds within the scope of the current project, but of course it would be useful to determine their exact production areas in some future study.

Acoma-Zuni painted and utility types both appear at Pottery Mound; it is only now becoming apparent how common Acoma-Zuni corrugated and plain utility sherds are at the site. As with the decorated types, the utility ware is typified by blocky white paste and temper including white or red potsherd or fine basalt (or both sherd and basalt). Thus, the Acoma-Zuni painted and utility wares can easily be distinguished from their locally-made counterparts at Pottery Mound, if one examines cross-sections under a microscope. Early tabulations from the site, based on cursory examination of sherd surfaces, probably mistook many Acoma-Zuni glazes sherds for ones made locally.

Hopi Pottery

The Hopi ware sherds at the site are easily recognized; their canary-yellow uniform paste and dark-brown or red paint contrast vividly with sherds made locally. Detailed descriptions of Awatovi (utility) and Jeddito (decorated) Yellow Ware are found in Colton (1956). Archaeologists have long been aware of the presence of Hopi pottery at Pottery Mound, and Hibben's work revealed multiple kiva murals in the Sikyatki style (Crotty 1995, 2007; Hays-Gilpin and LeBlanc 2007; Hibben 1975; Vivian 2007). Polly Schaafsma (2007) mentioned a Hopi connection in examining the symbolism of local rock art. It is not surprising that archaeologists have proposed a "Hopi connection" at Pottery Mound (Eckert 2008). One goal of my research was to more accurately document and quantify the Hopi pottery, in order to help define the nature of that connection.

Identifying Ceramic Sources

"Sourcing" pottery relies on identifying its constituent materials. Paste clays and tempers can be matched to materials sources found at their sources. Shepard's initial work (1942) defined the tempers of the Rio Grande glazeware. There are multiple studies of this kind for Pottery Mound (e.g., Eckert 2003; Franklin 2010b; Garrett 1976; Schleher 2010a).

At Pottery Mound, many of the exotic or "intrusive" pottery types are easily recognized by superficial traits; the Hopi yellow ware types such as Sikyatki Polychrome are a good example of this. In other cases, microscopic examination and petrographic analyses of paste and temper are needed to ensure proper assignment to ware, series, or type. In particular, identification of pottery from the Acoma-Zuni district relies on close analysis, since these Western glazeware types (Kwakina and Pinnawa in particular) were mimicked at Pottery Mound (as is seen in some Agua Fria Glaze-on-red and San Clemente and Pottery Mound Polychrome sherds). In such

cases, materials analysis can help identify local versus imported pottery. A careful study of temper is also useful at the local level, by illuminating where local potters obtained their tempering materials and how far they traveled to obtain them.

From previous work (e.g., Eckert 2003, Franklin 2010b, Schleher 2010a), we know that Pottery Mound potters relied on local red or red-brown clays to make both painted and utility vessels. Such clay occurs within easy walking distance of the site; indeed, the embankment on which the site sits is partly red clay. Small deposits of yellow, tan, and olive clay are also found in the area, and were to provide slips and paint colors. A pure white clay used at the site was not locally available, and must have been obtained by trade.

Temper in Local Pottery

At Pottery mound, the temper in local pottery was almost exclusively basalt. Hidden Mountain and Mojinos Mountain, 5 km west of Pottery Mound, have large exposures of Tertiary igneous rocks (Anderson et.al. 1996; New Mexico Geological Society 1982), and dikes, sills, and surface flows also occur in the area. In addition, large chunks of basalt litter the surface of the pueblo, and it seems likely that exhausted grinding tools—derived from the same outcrops—were smashed, pulverized, and used as temper. Whether temper was quarried directly, derived from old tools, or both, the temper derives from more than one local outcrop: the local pottery includes particles of red and black vesicular basalt, a fine, hard intergranular basalt, and a larger-grained diabase basalt.

Examination of outcrops at Hidden Mountain revealed the presence of some of these basalts, especially the black and red vesicular varieties. Denser black basalts were also noted (Franklin 2010b). The hard granular diabasic rocks probably derive from dikes or sills where the magma took some time to cool. While the texture of the quick-cooled basalts is very fine or aphanitic, the slower-cooled and denser basalts can have visible grains (phaneritic). In particular, diabase has grain sizes large enough to be seen with the naked eye, and displays a “salt and pepper” appearance. The ophitic texture of the darker, harder basalt reveals the presence of plagioclase, olivine, and augite or hornblende as the mafic minerals (Schleher 2010a). The aphanitic and phaneritic varieties of basalt were both used as grinding implements at Pottery Mound. Although earlier analyses identified the coarser-grained basalts as “intermediate igneous rock,” this ingredient is now believed to be a variety of dense, dark diabase. In the present study, this material is classed with the basalts and is attributed to the Hidden Mountain and Mojino Mountain flows.

The Pottery Mound potters rarely used temper other than basalts. Crushed potsherds were commonly used in the local Pueblo III period pottery, particularly in Socorro Black-on-white, but the practice was abandoned soon after the emergence of the Rio Grande glazeware tradition and glazeware production at Pottery Mound almost never reverted to the practice. Rare instances of quartz sand temper are seen, primarily in utility wares. Sand does not bind well with clay, due to its rounded grains, and was seldom utilized by potters anywhere in the whole glazeware production region. Instead, crushed igneous rock was were preferred (it has angular grains, and does not alter during firing). Perhaps small amounts of sand were inadvertently added as clays and tempers were being processed.

Temper in Imported Pottery

Glazeware sherds from the Galisteo Basin pueblos occur in small numbers in all of the Pottery Mound collections I have studied. Typically they contain crushed intermediate igneous rock such as hornblende latite (at Tonque; Warren 1969) or monzonite (at San Marcos; Schleher 2010b). These imports can also be spotted at Pottery Mound due to differences in painted design.

Mica and micaceous schist were common temper ingredients along the Rio Grande in Pueblo IV times, especially for utility vessels. The mica affords some protection against breakage and thermal shock, which made micaceous clay and micaceous temper increasingly popular during the period. Mica schist was used preferentially in the utility ware at Tijeras Pueblo (Franklin 2012; Warren 1980), and muscovite or biotite mica is often seen in utility pottery at sites along the Rio Grande (for example, Chamisal Pueblo and Piedras Marcadas). The mica used along the Rio Grande came from mica bearing rocks or residual clay deposits containing mica rather than from foliated schists. There are no mica deposits near Pottery Mound, and utility vessels with micaceous temper must have come from villages along the Rio Grande.

While crushed sherd temper was rarely used at Pottery Mound, but it is diagnostic of the painted and utility wares of the Acoma-Zuni region to the west. Indeed, the appearance of fine white paste together with potsherd temper is defining. In the Acoma-Zuni pottery, red or black basalt particles may also be present; these inclusions are more finely ground than those in Pottery Mound sherds. Also, the inclusions derive from different, more recent sources (such as the Malpaís) and can be distinguished from the Pottery Mound area basalts. In particular, the Acoma-Zuni basalts are very finely granular aphanitic and have a salt-pepper appearance under the microscope.

Decorated Hopi pottery (Jeddito Yellow Ware) is distinguished by its distinctive yellow paste, which includes rare rounded sand grains, red particles, or bits of crushed sherd. Hopi utility pottery (Awatovi Yellow Ware), whether plain or corrugated, can includes large amounts of quartz sand visible on the surface, continuing a tradition dating back to Lino Gray. Such sherds also include occasional particles of crushed sherd.

Biscuit ware (both A and B) was traded from the Pajarito Plateau and Chama Valley. This ware, which appears rarely in the Pottery Mound collection, is typified by a granular tan paste with tuff or very fine sand temper.

Temper Frequencies in the Surface Collection

Table 2 provides the temper frequencies by pottery type for the entire sample of sherds. For Rio Grande Glaze Ware, basalt tempers are as dominant as expected. Basalt temper was found in 99 percent of the Rio Grande Glaze Ware (and in 93 percent of the Rio Grande utility ware). A distinction can be made between vesicular basalts (both red and black) (Temper Code 4) and dark, hard, diabase basalts (Temper Code 8). In making Rio Grande Glaze Ware, the local potters made heavy use of both basic varieties of basalt. Of the Rio Grande Glaze Ware sherds, 52.1 percent included red or black basalt temper and 46.9 included diabasic basalt temper.

The 18 sherds with potsherd temper (0.2 percent) appear mainly represent early types such as Los Padillas Glaze Polychrome. Only 31 sherds (0.3%) had quartz sand. In sum, local glazeware production is almost synonymous with the use of basalt temper, albeit the variety of basalt being used varied.

Glazeware production in the Galisteo Basin is typified by intermediate igneous tempers of hornblende latite and monzonites (Schleher 2010b). The 45 sherds (0.5%) with hornblende latite represent imports from pueblos in that region. The sherds include Glaze B (the Largo series) and Glaze C (Espinoso Glaze Polychrome).

The "Other Painted Types" category in Table 3 includes Pueblo III period white wares (Socorro and Santa Fe Black-on-white) predating the demonstrable occupation of Pottery Mound (which began about 1350). These types are common in the Coalition period sites of the area, including around Pottery Mound (e.g., Fenenga and Cummings 1956). The white wares typically include fine potsherd or fine crushed rock (or both) as temper. The category also includes late White Mountain Red Ware types, especially St. Johns Polychrome and its glaze-painted derivative, Heshotauthla Polychrome. The types exhibit a characteristic light buff paste and conspicuous sherd temper. White Mountain Red Ware bowls were popular imports at the late Pueblo III villages on the Lower Rio Puerco. Finally, the very few sherds of northern Biscuit Ware (Abiquiu and Bandelier Black-on-gray) that reached Pottery Mound were included in this general category. The Biscuit Ware vessels were tempered with fine volcanic tuff or fine sand, and decorated with a vegetal-based black paint.

The Rio Grande utility wares comprise vessels with both corrugated and plain surfaces. As might be expected, the dominant temper type is basalt: 93 percent of the sherds contain some kind of basaltic temper. Four out of five of the Rio Grande utility sherds were tempered with red or black vesicular basalt (78.8 percent), in contrast with the glazeware sherds where the dominant temper type was dark hard diabase (46.9 percent). Potters may preferred one basalt outcrop for glazeware production, another for the utility wares.

The appearance of micaceous schist in 422 Rio Grande utility ware sherds (5.4 percent) is not unexpected, as these have turned up in previous analyses. Use of mica temper was confined to utility vessels. There is no source for mica anywhere near the site, and it appears that mica-tempered vessels (as opposed to tempering material) were imported, probably from villages along the Rio Grande. While I did not refire sherds from the surface collection, the micaceous sherds in that collection have a tan paste that contrasts with the dark red paste typical of local Pottery Mound utility wares (Franklin 2010b). Many villages along or near the Rio Grande (Chamisal, Montaño Bridge, Alameda Pueblo, and Tijeras Pueblo among them) produced large amounts of mica-tempered utility pottery, so people at Pottery Mound did not have to travel far to obtain such vessels.

A few of the utility sherds (132, or 1.7 percent) have quartz sand, which may or may not have been intentionally added. Only 14 (0.2 percent) have crushed sherds, again possibly an accidental inclusion. None have hornblende latite or volcanic tuff, and it appears that utility vessels were not imported from the northern Rio Grande Valley or the Galisteo Basin.

Based on the sherd counts, the Acoma-Zuni area was the source of most of the imported pottery on the site surface. The sherds exhibits all of the traits characteristic of this production zone, including fine white paste and potsherd temper. Both painted and utility pottery was imported; when those are considered together, 59.0 percent were tempered with crushed sherds and an additional 39.4 percent were tempered with a mix of crushed sherds and very fine particles of basalt. The latter are not identical to the basalts employed by Pottery Mound potters (but they are included among the generic "red/black" basalts in Table 2). Quartz sand is present in 1.1 percent of the Acoma-Zuni sherds; other tempers are of negligible importance.

When the Acoma-Zuni painted types are examined separately (Codes 810–831), 93.0 percent (377 sherds) are tempered primarily with crushed sherds. Only 5.8 percent (24 sherds) have fine basalt temper. In other words, the painted vessels were almost always tempered with crushed sherds, sometimes with a bit of igneous rock added. The utility types from the area have the same tempers, but not in the same proportions. One-third (33 percent) of the plain and corrugated utility sherds have potsherd temper, while two-thirds (66 percent) have fine basalt temper or a mix of sherd and basalt temper. In sum, potters in the Acoma-Zuni area had two basic temper recipes, exhibiting a clear preference for sherd temper when making painted vessels and for fine basalt or basalt-sherd tempers when making utility wares.

Hopi painted and utility types are easily identified thanks to their yellow paste, usually with very little visible temper (the painted types) or a fine quartz sand temper (mostly the utility types) (Colton 1956). Fine quartz sand was found in 79.4 percent of the Hopi sherds. Fine crushed sherd temper was visible in 20.0 percent of the sherds. Taken separately, the painted Hopi sherds included 82 percent with fine quartz sand temper and 16.7 percent with sherd temper. Similar proportions are seen for the Hopi utility sherds.

Ware and Type Frequencies

Rio Grande Glaze Ware

Rio Grande Glaze Ware makes up 50.6 percent of all sherds and 94.8 percent of the decorated sherds in the collection (Table 3). Typically, the glazeware vessels made at Pottery Mound had a red to reddish-yellow paste in addition to basalt temper. At Pottery Mound (and elsewhere in the Rio Abajo region), Glaze A style rims continued to be made well into subsequent periods, and appear on both glaze-on-red and glaze polychrome bowls. In particular, the absence of Glaze B rims does not imply that local sites were abandoned in Glaze B times, only that that local potters continued making Glaze A style rims instead of switching to the new style.

Given the continued popularity of Glaze A style rims, it is not surprising that Glaze A sherds dominate the glazeware assemblage. Agua Fria Glaze-on-red is by far the most common type (493 rim sherds), followed by San Clemente Polychrome (208 rims) and Pottery Mound Polychrome (142 rims). Smaller amounts of Los Padillas and Arenal Polychrome, from early in the glazeware sequence, are present. Equally small amounts of yellow-slipped Cieneguilla Glaze-on-yellow and Cieneguilla Polychrome also occur, but these yellow-slipped types were never as popular at Pottery Mound as they were in the Galisteo Basin.

Table 3. Pottery Mound Surface Sherds by Frequency and Percent.

Code	Description	Count	Percent
	Rio Grande Glaze Ware Body Sherds, No Paint		
91	Ext. and int. red or orange (probably Agua Fria G/R)	5031	27.6%
93	Ext. red, int. white or vice versa (probably San Clemente Poly.)	168	0.9%
	Rio Grande Glaze Ware Body Sherds, Paint Present		
97	Red or orange slip, glaze paint (probably Agua Fria G/R)	2019	11.1%
98	Ext. red, int. white or vice versa (probably San Clemente Poly.)	1084	5.9%
99	Polychrome with glaze paint (probably Pottery Mound Poly.)	12	0.1%
	Rio Grande Glaze A (Rims or Highly Diagnostic Portions)		
101	Los Padillas Polychrome (sherd temper)	2	0.0%
105	Arenal Polychrome (rock temper)	2	0.0%
110	Agua Fria Glaze-on-red (including orange slip variety)	493	2.7%
116	San Clemente Poly (also including Codes 115, 117–119)	208	1.1%
120	Cieneguilla Glaze-on-yellow	4	0.0%
121	Cieneguilla Polychrome	1	0.0%
125	Pottery Mound Poly. (also including Codes 126 and 127)	142	0.8%
	Rio Grande Glaze C		
301	Espinoso Polychrome	8	0.0%
302	Kuaua Polychrome	46	0.3%
	Rio Grande Glaze D		
401	San Lazaro Polychrome	3	0.0%
Total, Rio Grande Glaze Ware		9223	50.6%
	Other Painted Types		
9	Plain white (from black-on-white vessel)	3	0.0%
12	Socorro Black-on-white	20	0.1%
15	Santa Fe Black-on-white	1	0.0%
25	Biscuit A (Abiquiu Black-on-gray)	2	0.0%
30	Biscuit B (Bandelier Black-on-gray)	2	0.0%
50	St. Johns Polychrome	4	0.0%
55	Heshotauthla Polychrome	3	0.0%
Total, Other Painted Types		35	0.2%
	Rio Grande Utility Wares		
701	Clapboard corrugated (exposed coils)	44	0.2%
705	Indented corrugated (without wiping or smearing)	110	0.6%
710	Plain (any coils or indentations completely obliterated)	7719	42.4%
725	Los Lunas Smudged	2	0.0%
726	Pitoche Ribbed	2	0.0%
Total, Rio Grande Utility Wares		7877	42.2%

Table 3. Pottery Mound Surface Sherds by Frequency and Percent.

Code	Description	Count	Percent
Acoma and Zuni Painted and Utility Wares			
810	Kwakina Polychrome	114	0.6%
820	Pinnawa Polychrome	77	0.4%
821	Kechipawan Polychrome	6	0.0%
830	Generic Acoma-Zuni painted	115	0.6%
831	Undecorated portions from Acoma-Zuni painted vessels	95	0.5%
740	Cibola-Acoma-Zuni plain utility	449	2.5%
741	Cibola-Acoma-Zuni corrugated utility	70	0.4%
Total, Acoma-Zuni Wares		926	5.1%
Hopi Painted and Utility Wares			
850	Jeddito Black-on-yellow	18	0.1%
860	Sikyatki Polychrome	7	0.0%
870	Hopi yellow ware, not further specified	59	0.3%
880	Hopi utility, plain surface	16	0.1%
881	Hopi utility, corrugated surface	14	0.1%
885	Hopi or Acoma plain utility	33	0.2%
886	Hopi or Acoma corrugated utility	13	0.1%
Total, Hopi Painted and Utility Wares		160	0.9%
999	Unknown	3	0.0%
Grand Total		18224	100.0%

The Glaze A assemblage is dominated by three types: Agua Fria Glaze-on-red, San Clemente Glaze Polychrome, and Pottery Mound Glaze Polychrome, in descending order of frequency.

As was mentioned, Glaze B pottery (Ca. A.D. 1425–1450) is all but absent at Pottery Mound, and the surface sample includes no classic Glaze B sherds. An earlier study (Voll 1961) did document rare sherds of Largo Glaze-on-red and Largo Glaze Polychrome.

The surface collection includes Glaze C sherds, and recent radiocarbon dates (Franklin 2008) confirm that Pottery Mound continued to be occupied during the Glaze C period of (A.D. 1450–1490). The low relative frequency of Glaze C sherds (54 rims) reflects a continued preference for vessels with Glaze A rims, a drop in the village's population, or both.

Eight rim sherds of Espinoso Glaze Polychrome display the thickened, "lozenge-shaped" rims and polychrome designs that define this type. The eight Espinoso rims indicate vessels imported from the Galisteo Basin pueblo district, as they exhibit the yellow paste and hornblende latite temper characteristic of that production district.

Kuaua Polychrome (46 rims) is much more common than Espinoso Polychrome at Pottery Mound. This is not surprising, since Kuaua represents the Glaze C rim style as expressed in the southern part of the Rio Grande Glaze Ware area.

Glaze D is represented by 3 rims. Earlier studies at Pottery Mound also revealed the presence of small amounts of Glaze D pottery at the site, and Mera's type collection from LA 416 contains both Glaze D and Glaze E sherds (Appendix A). Several sherds of San Lazaro Polychrome were identified in the upper levels of the stratigraphic test excavated under Linda Cordell's direction in 1979 (Franklin 2007). We have seen additional Glaze D sherds on the site, especially in the eastern section, and on the outlying area recorded as LA 161791. The rare Glaze D rims indicate that a small remnant population was still in place as late as 1490 or 1500.

Black-on-white Pottery

Only 28 black-on-white sherds were identified in this collection. Twenty are Socorro Black-on-white. The black-on-white pottery at the site has always been a mystery, and it may be (as Frank Hibben suspected) that the Pueblo IV village is underlain by a smaller Pueblo III settlement.

The one Santa Fe Black-on-white sherd represents a vessel brought in from a Pueblo III period village on the Rio Grande. Biscuit ware pottery from the northern Rio Grande region is almost as poorly represented: two Biscuit A (Abiquiu) and two Biscuit B (Bandelier) sherds were collected. The relative paucity of biscuitware types is intriguing, given the relative proximity of its manufacturing zone. Three other sherds were from white wares, but lacked paint or other diagnostic traits.

White Mountain Red Ware

The surface sample includes four St. Johns Polychrome sherds and three Heshotauthla Polychrome. Like the black-on-white sherds, they hint at an underlying Pueblo III component, because the Pueblo III villages in the vicinity often contain St. John's Polychrome or Wingate Black-on-red.

Utility Wares

Rio Grande utility pottery accounts for four sherds out of every 10 in the sample. This contrasts with Pueblo I through Pueblo III period assemblages, where utility wares comprise 70 to 90 percent of the sherds. In Pueblo IV times, clearly, painted pottery became even more important (or at least more widely used) than it had been.

The two types of corrugated pottery amount to only 0.8 percent of all pottery, whereas plain utility pottery made up 42.4 percent of the sample (the biggest single ceramic category). The contrast shows how rare exposed coils and corrugation had become, after dominating utility Pottery during the Pueblo II and II periods.

The utility ware sherds include two of Los Lunas Smudged and two of Pitoche Ribbed. These are typically found in the Lower Puerco and Middle Rio Grande sites during the Pueblo III period,

so represent another anachronism in the assemblage. The pastes and temper appears in the four sherds are typical of examples made along the Rio Grande, so they were probably not made at Pottery Mound.

Glazeware of the Acoma-Zuni Area

Taken together, the Acoma-Zuni painted and utility sherds are by far the largest intrusive ceramic group at Pottery Mound: 926 sherds or 5.1 percent of the sample. As Table 3 shows, the decorated types (Kwakina, Pinnawa, and Kechipawan) make up 4.2 percent of the decorated sherds. When the non-local decorated pottery is considered separately (Table 4), the pattern is even more striking: four out of five non-local decorated sherds come from the Acoma-Zuni area.

The more than 400 sherds of plain and corrugated utility pottery from the Acoma-Zuni area should not be overlooked either. If only decorated pottery was coming from the Acoma-Zuni area, the pattern might be written off as simple demand for desirable pottery. Instead, the presence of a composite assemblage—both decorated and utility ware—suggests that the process was a complicated one. The predominance of Acoma-Zuni area pottery among the Pottery Mound imports has not been adequately recognized in earlier work, and has implications for future studies of trade and migration in the area.

Hopi Pottery

In terms of actual numbers, pottery from the Hopi area does not measure up to that from the Acoma-Zuni area. The 160 Hopi sherds include 84 from decorated vessels (Table 3 and 4). Jeddito Black-on-yellow and Sikyatki Polychrome are both present in the sample; the former is about twice as frequent as the latter. The 84 Hopi sherds from decorated vessels were concentrated in certain areas, as will be shown below.

At the same time as my own fieldwork, David Phillips made a separate surface collection of Hopi sherds, using a point provenience approach. Those additional sherds are listed and discussed in Appendix B.

As was the case for the Acoma-Zuni wares, Hopi utility pottery was also imported. Thirty plain and corrugated utility sherds were from Hopi vessels. An additional 46 utility sherds were not securely identified as either Acoma-Zuni or Hopi—but they were one or the other. Provisionally, they are considered Hopi, as they have yellow-white paste and rounded quartz sand temper. The 160 Hopi-area sherds (including the provisional assignments) make up 0.9 percent of the sherds in the sample (Tables 3 and 4). Hopi decorated pottery is 0.9 percent of all decorated pottery, and 16.4 percent of all non-local decorated pottery (Table 4). Hopi pottery is thus the second most common imported pottery at the site (after pottery from the Acoma-Zuni area), with both painted and utility types strongly represented.

Table 4. Summary Comparisons, Based on Table 3.

	Count	Percent
Painted versus Utility		
Painted	9752	53.5%
Utility	8472	46.5%
Total	18224	100.0%
Middle Rio Grande Region versus Other Origins		
Middle Rio Grande Region*	17123	94.0%
Other origins	1101	6.0%
Total	18224	100.0%
Painted Wares: Local versus Non-Local		
Local, including Socorro Black-on-white	9241	94.8%
Non-local, including Santa Fe B/W, Espinoso Poly.	511	5.2%
Total (all sherds from painted wares)	9752	100.0%
Utility Wares: Local versus Non-Local		
Middle Rio Grande Region (including micaceous utility)	7877	93.0%
Other origins	595	7.0%
Total (all utility ware sherds)	8472	100.0%
Acoma-Zuni Area		
All Acoma-Zuni pottery (decorated and utility), versus	926	5.1%
All pottery	18224	100%
Acoma-Zuni decorated pottery, versus	407	4.2%
All decorated pottery	9752	100%
Acoma-Zuni decorated pottery, versus	407	79.6%
All non-local decorated pottery	511	100%
Hopi		
All Hopi pottery (decorated and utility), versus	160	0.9%
All pottery	18224	100%
Hopi decorated pottery, versus	84	0.9%
All decorated pottery	9752	100%
Hopi decorated pottery, versus	84	16.4%
All non-local decorated pottery	511	100%
Comparing the Western Imports		
All Acoma-Zuni pottery, versus all Western Pueblo pottery	926	85.3%
All Hopi pottery, versus all Western Pueblo Pottery	160	14.7%
All Western Pueblo pottery	1086	100.0%

*Includes Espinoso Polychrome, San Lazaro Polychrome, and micaceous utility.

Comparison with Two Other Pottery Mound Sherd Counts

Table 5 compares the surface collection with two other sets of data from Pottery Mound, one derived from the 1979 stratigraphic test (Cordell 1980a; Franklin 2008) and the other from several earlier studies (Cordell 1980b; Hibben 1986; Voll 1961; compiled by Curtis Schaafsma [2007]). Eckert's published data (2003, 2007) are organized around design and temper attributes, so are not directly comparable to the type-oriented data created for this study. The three-part comparison in Table 5 considers key groups of painted wares: Acoma-Zuni, Hopi, and Pottery Mound Glaze Polychrome. The numbers are somewhat consistent from sample to sample: in each, Acoma-Zuni painted wares outnumber the Hopi painted wares. Also, Pottery Mound Glaze Polychrome sherds are consistently more common than the Hopi painted sherds.

Table 5. Comparison of Three Pottery Mound Samples.
(Decorated wares only)

	2010 Surface Collection (this report)		1979 Stratigraphic Test (Franklin 2008)		Compilation of Earlier Studies (Schaafsma 2007)	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Acoma-Zuni painted	407	4.17%	353	1.72%	1638	3.68%
Hopi painted	84	0.86%	222	1.08%	1591	3.57%
Pottery Mound Glaze Poly.	142	1.46%	697	3.39%	2609	5.86%
Total decorated	9752		20555		44535	

The data in Table 5 do need to be taken with a grain of salt. The contexts vary (the general site surface versus stratified trash deposits versus rooms). So did the field methods (the collections from the 1979 stratigraphic test and from the recent field collection were obtained in a systematic fashion, but the Hibben-era collections were not. In particular, the pre-1979 collecting approach rarely included screening, and some utility wares and other non-diagnostic sherds may have been discarded). Finally, identifications vary as well. To provide one example, opinions can vary as to what constitutes a sherd of Pottery Mound Glaze Polychrome. Examination of paste and temper attributes helps ensure consistent identification of named types, but during the era when Hibben was actively working at the site, the general practice was to "flip" sherds into piles representing types, based on quick macroscopic inspection.

Distribution Across the Site

One goal of the surface collection was to document wares and types across the site and to determine whether some of those were concentrated in certain areas. The data derive from three separate efforts: Phase 1, a sample of the general site surface; Phase 2, which sampled the West Midden; and Phase 3, which sampled the South Midden. (The material from Linda Cordell's

1979 stratigraphic test provides a sample of the third obvious midden on the site, the North Midden.) Table 6 compares the collections derived from each of the field efforts.

Table 6. Comparison of Ware Frequencies Among Surface Collection Areas.

Totals by Category	**Genl. Surface** (40 squares, each 1 by 1 m)		**West Midden** (50 squares in 2 transects)		**South Midden** (50 squares in 2 transects)		**Total**	**Percent**
Miscellaneous types	4	0.2%	9	0.2%	22	0.2%	35	0.2%
Rio Grande Glaze Ware	1062	50.3%	2623	48.9%	5538	51.5%	9223	50.6%
Rio Grande utility	919	43.5%	2513	46.8%	4445	41.4%	7877	43.2%
Acoma-Zuni	123	5.8%	203	3.8%	600	5.6%	926	5.1%
Hopi	3	0.1%	15	0.3%	142	1.3%	160	0.9%
Unknown			3	0.1%			3	0.0%
Total	2111	100.0%	5366	100.0%	10747	100.0%	18224	100.0%

Phase 1, the collection of the general site surface, yielded 2,111 sherds from 40 units each measuring 1 by 1 m, located at the 25 m points on the site grid (additional squares were checked, but lacked artifacts). Despite the small sample size, this first phase collection is suggestive. First, the proportion of painted versus utility pottery is roughly the same across the site: throughout the sample, utility wares are 44 to 48 percent of the total sherd count. In other words, no one area yielded abnormal amounts of the pottery usually associated with cooking and storage.

For the West Midden, frequencies of the major sherd categories are within two percentage points of those for the general site collection (Table 6), but the South Midden collection diverges from the other two samples. The 89 collection units (each 1 by 1 m) from the general surface and West Midden yielded 18 Hopi sherds (0.2 percent of the sample) but the 50 units in the South Midden yielded 142 Hopi sherds (1.3 percent of the sample) (Table 6). To put it differently, the South Midden sample includes 1.4 times as many sherds as the other two samples combined, but yielded 7.9 times as many Hopi sherds as the other two samples. As Table 7 shows, it is highly unlikely that this pattern is due to chance alone.

A similar if less dramatic pattern is evident for the Acoma-Zuni area sherds. The combined general surface and West Midden samples yielded 125 Acoma-Zuni sherds (1.7 percent of the sample) and the South Midden sample yielded 282 Acoma-Zuni sherds (2.6 percent of the sample). Thus, while the South Midden sample includes 1.4 times as many sherds as the other two samples combined, it yielded 2.3 times as many Acoma-Zuni sherds as the other two samples. Again, the pattern does not appear to be due to chance alone (Table 7).

These patterns are not due to comparing midden to non-midden contexts. When the West and South Middens are compared (Table 7), the South Midden clearly has more Hopi and Acoma-Zuni sherds than the West Midden. (Also, Acoma-Zuni sherds make up 1.0 percent of the North Midden collection [401 sherds; Franklin 2007].)

Table 7. Chi-Square Tests.
(Statistics provided by David Phillips)

	General/ W Midden	S Midden	Totals
Hopi	18	142	160
Percent	0.2%	1.3%	1.6%
Non-Hopi	7459	10605	18064
Percent	99.8%	98.7%	99.1%
Totals	7477	10747	18224
Chi-square (Yates) = 57.92, 1 d.f., p <.0001			
	General/ W Midden	**S Midden**	**Totals**
Acoma-Zuni	125	282	407
Percent	1.7%	2.6%	4.3%
Non-Acoma-Zuni	7352	10465	17817
Percent	98.3%	97.4%	97.8%
Totals	7477	10747	18224
Chi-square (Yates) = 17.88, 1 d.f., p <.0001			
	W Midden	**S Midden**	**Totals**
Hopi	3	142	145
Percent	0.1%	1.3%	1.4%
Non-Hopi	5363	10605	15968
Percent	99.9%	98.7%	99.1%
Totals	5366	10747	16113
Chi-square (Yates) = 62.85, 1 d.f., p <.0001			
	W Midden	**S Midden**	**Totals**
Acoma-Zuni	90	282	372
Percent	1.7%	2.6%	4.3%
Non-Acoma-Zuni	5276	10465	15741
Percent	98.3%	97.4%	97.7%
Totals	5366	10747	16113
Chi-square (Yates) = 14.22, 1 d.f., p <.0002			
	All Surface	**N Midden**	**Totals**
Pottery Mound Poly.	142	697	839
Percent	0.8%	1.8%	1.5%
non-Pottery Mound Poly.	18082	37732	55814
Percent	99.2%	98.2%	98.5%
Totals	18224	38429	56653
Chi-square (Yates) = 89.97, 1 d.f., p <.0001			

Table 8 contrasts the Hopi and Acoma-Zuni sherds by painted versus utility vessels, as well as by collection phase.

Table 8. Acoma-Zuni and Hopi Sherds: Painted versus Utility.

	All Sherds	Acoma-Zuni	Percent	Hopi	Percent
Phase 1: General Site Surface Collection					
Painted	1103	35	3.17%	2	0.18%
Utility	1008	88	8.73%	1	0.10%
Total	2111	123	5.83%	3	0.14%
Phase 2: West Midden Collection					
Painted	2738	90	3.29%	13	0.47%
Utility	2628	113	4.30%	2	0.08%
Total	5366	203	3.78%	15	0.28%
Phase 3: South Midden Collection					
Painted	5911	282	4.77%	69	1.17%
Utility	4836	318	6.58%	73	1.51%
Total	10747	600	5.58%	142	1.32%
Phase 1–3 Combined Collection					
Painted	9752	407	4.17%	84	0.86%
Utility	8472	519	6.13%	76	0.90%
Total	18224	926	5.08%	160	0.88%

Table 9 expands the examination of Hopi sherds across the site, to include sherds from the 1979 stratigraphic test in the North Midden (Franklin 2007). In Table 9, the samples are not fully comparable; some sherds are from the surface collection, others from an excavation unit with 17 levels. Although the 1979 stratigraphic test yielded more Hopi sherds than the South Midden, the percentage of Hopi sherds is higher for the South Midden. The 239 Hopi sherds from the North Midden test are 0.6 percent of all pottery from that test, while the 142 Hopi sherds from the South Midden surface collection are 1.3 percent of all pottery from that context.

Based on the surface collections, Hopi sherds also show a higher density per square meter on the South Midden than elsewhere in the site (Table 9). For the 40 m^2 collected across the site, during Phase 1, there was an average of 0.08 Hopi sherd per square meter (and this does not include units within the site boundaries that had no artifacts). For the 50 m^2 collected within the West Midden (Phase 2), we found and average of 0.3 Hopi sherd per square meter. Within the South Midden, 50 m^2 produced 2.8 Hopi sherds per square meter. In this way as well, the South Midden stands out: Hopi sherd density was nine times that of the West Midden.

In a separate study of 518 point-provenienced Hopi sherds from across the site (Appendix B), Phillips also concluded that such pottery is concentrated in the southwest portion of the site.

Table 9. Comparison of Hopi Sherd Frequencies Across Pottery Mound.
(Including this project and the data from Franklin 2007)

	General Surface	West Midden	South Midden	Surface Totals	1979, N. Midden	Totals
Total sherds	2111	5366	10747	18224	38429	56653
Hopi sherds, total	3	15	142	160	239	399
Hopi, decorated	2	13	69	84	222	306
Hopi, utility	1	2	73	76	17	93
Pct. Hopi to all sherds	0.1%	0.3%	1.3%	0.9%	0.6%	0.7%
Hopi sherds, density per square meter	0.08	0.3	2.8	1.2	n/a	n/a

The distribution of Pottery Mound Polychrome was also examined. Locally made, this type achieved a sophistication of design rarely matched in the prehistoric Southwest. The distribution of Pottery Mound Polychrome across the site might indicate residence areas for the potters who made the type, or areas where the pottery was used more heavily.

The 142 sherds of Pottery Mound Polychrome from the surface collection included six from the general (Phase 1) surface collection (0.3 percent of all sherds), 34 from the West Midden (0.6 percent of all sherds), and 102 from the South Midden (1.0 percent of all sherds). Thus, the trends for Pottery Mound Polychrome somewhat mirror those for the Acoma-Zuni and Hopi sherds in the surface collection sample. However, the 1979 stratigraphic test in the North Midden yielded 697 sherds of Pottery Mound Polychrome (1.8 percent of all sherds) (Franklin 2007). This is roughly twice the percentage of such sherds found in the combined surface collection (0.8 percent; Table 3). Thus, Pottery Mound Polychrome sherds are relatively much more common in the North Midden than anywhere else I examined. The pattern does not appear to be due to sampling error alone (Table 7). In summary, Pottery Mound Polychrome—which was made at the site—was discarded differently than the imported Western Pueblo wares.

Chapter 4

CONCLUSIONS

This is the last of my series of reports on the pottery of Pottery Mound. In the next few pages I will look back over what I have learned (or at least suspect) based on the entire series of reports (see Franklin 2007, 2008, 2010b).

The Ceramic Sequence

Pottery Mound was occupied between A.D. 1350 and 1490, and possibly somewhat later. This estimate is based on four tree-ring dates, three radiocarbon dates, and ceramic cross-dating. Many well-dated pottery types appear at Pottery Mound (Franklin 2007, Table 1).

The big Rio Grande villages emerged in the mid-1300s and are characterized by the production and use of Rio Grande Glaze Ware. In many cases, the massive Pueblo IV period construction overlies earlier Pueblo III villages that produced Socorro Black-on-white, Santa Fe Black-on-white, or both. The best dated Glaze A town is Tijeras Pueblo, where more than 400 tree ring dates were obtained; there, glazeware production starts as early as 1315 (Cordell 1980a). Dating is less precise for villages along the Rio Grande, but early 14th century starting dates seem confirmed at Valencia, Chamisal, Piedras Marcadas, and Montaño Bridge (Franklin 1997, 2010a) and also at Alameda Pueblo (Cordero 2013). The inspiration for the early Rio Grande glazeware pottery was the late types in the White Mountain Red Ware series, particularly St. Johns and Heshotauthla Polychrome (made in villages along the Little Colorado River in Arizona). St. Johns Polychrome was widely traded in the late 1200s, and telltale sherds with orange slips and incipient glaze paints stand out in the painted assemblages (otherwise black-on-white) in Pueblo III (Coalition) villages of the middle Rio Grande and lower Rio Puerco.

According to most archaeological narratives, the import of White Mountain Red Ware pottery was followed by an influx of people from what had been the northern Mogollon settlements, rapidly increasing the population along the middle Rio Grande. At Pottery Mound, the parallel rows of rooms, square kivas, kiva iconography, polished and smudged utility pottery also provide evidence of the spread of ideas, and probably people, out of the late Pueblo III period pueblos above the Mogollon Rim in Arizona. Similar movements occurred across the Southwest at this time; into Hopi, Zuni, and the northern Rio Grande region. Local adoption of glazeware paints and oxidizing atmospheres led to the distinctive Rio Grande Glaze Ware series, albeit the earliest types (such as Los Padillas Glaze Polychrome) bear a residual resemblance to the White Mountain series in using sherd temper and in the painted designs.

Pottery Mound has yielded very little of the earliest Rio Grande Glaze Ware types (Los Padillas and Arenal) which with the few absolute dates suggests that the site was not founded as early as Tijeras Pueblo and some other glazeware-using Rio Grande settlements. Given the apparent lack of occupation at Pottery Mound during the earliest part of the Pueblo IV period, it is not clear to what extent the Pueblo III population of the lower Puerco contributed to the formation of the

village. At the least, immigrant groups must have augmented the local populace, and these immigrants must have come from northern Mogollon areas to the west. I further suspect that the earliest immigrants did not arrive from an intermediate point of aggregation, such as Acoma or Zuni, but derived directly from the populations departing the valley of the Little Colorado. This is suggested by the simultaneous development of glaze painting on the Rio Grande as well as in the Acoma-Zuni district. There was, perhaps, a slight temporal priority of types such as Kwakina Polychrome in the west (Huntley 2008), but otherwise the development of glaze painting was practically simultaneous across the zone in which it became dominant.

Once established about A.D. 1350, Pottery Mound grew rapidly. It also developed variations on the glazeware theme, inspired (at least in part) by the quantities of imported ceramics from the Western Pueblo villages. With the appropriate raw materials readily available, Pottery Mound potters generated massive amounts of pottery, achieving a peak in artistic design. In the process the village became a center for inter-village exchange, probably involving many goods besides ceramics.

As we consider the village's development, the data from the 1979 stratigraphic test are instructive (Franklin 2007, Table 5). Seventeen levels were excavated; there was no Hopi pottery below Level 14, and only three Hopi painted ware sherds in Level 14. By way of comparison, 21 Acoma-Zuni painted sherds were found in Level 14 down to Level 17. Beginning with Level 13, both Acoma-Zuni and Hopi types were present in consistent numbers, although Acoma-Zuni sherds were numerically more dominant, especially in the lower levels. Levels 12 through 17 yielded 55 Acoma-Zuni decorated ware sherds, as opposed to 21 Hopi decorated ware sherds in the same levels.

Pottery Mound Glaze Polychrome is also absent from the earliest level, and rare in the levels immediately above it. In the 1979 test, only two such sherds were found below Level 13, and only 18 below Level 11 (Franklin 2007, Table 5). Thus, the development of Pottery Mound Glaze Polychrome coincides with the arrival of Hopi imports. We can see this local polychrome type as a stylistic hybrid, involving Hopi-inspired designs incorporated into Rio Grande layouts. Given Hays-Gilpin and LeBlanc's (2007:115) conclusion that "Sikyatki style does not appear until sometime after 1400," we should similarly not expect Pottery Mound Glaze Polychrome to appear in the earliest deposits at the site.

After at least 150 years of occupation, through Glaze A, B, and C times, the population began to dwindle by 1475. However, the latest radiocarbon date, together with repeated finds of San Lazaro Glaze Polychrome, suggest the presence of a remnant population concentrated at the east end of the site. It is conceivable that this remnant population held on as late as A.D. 1500 or slightly later. The Glaze D and E ceramics from the final occupation had the same paste and temper ingredients seen in earlier Pottery Mound vessels, so most likely were locally made. Stylistically, local potters adhered to the trends common throughout the Middle Rio Grande region, and the uniqueness and variety of Pottery Mound ceramics had been lost.

Ceramic Exchange

Pottery is well suited to measuring the direction and intensity of exchange among population centers of the ancient Southwest, due to its excellent preservation, easily identified origins, and common usage among Southwestern cultures. Many other items were exchanged for which the evidence is far more limited, due to poor preservation (e.g., cloth, hides, and food). I will consider the evidence for ceramic exchange, well aware that pottery was only one of many items being traded.

Pottery Mound yielded more than three dozen major named pottery types (Table 1), a level of ceramic diversity that may surpass that of any other prehistoric Southwestern site. The quantity and variety of sherds on the site's surface has astounded visitors as well as archaeologists. My study of pastes, tempers, and local sources has shown that most of the Rio Grande Glaze Ware found at Pottery Mound was made locally (probably also the case for the site's utility pottery) (Franklin 2010b). The locally made types include Los Padillas, Arenal, and Agua Fria Glaze-on-red; Cieneguilla Glaze-on-yellow, and Cieneguilla, San Clemente, Pottery Mound, Espinoso, and San Lazaro Glaze Polychrome. Clays matching the paste and slip clay colors for these types are available within easy walking distance of the site. Basalts of different kinds are available as hard rock outcrops at Hidden Mountain and the Mesas Mojinas, beginning some 8 km (5 miles) away (by car odometer, as a rough estimate of walking distance).

The evidence for local production does not mean that all vessels of these types were made at Pottery Mound. Espinoso Glaze Polychrome (of Glaze C times) was rarely made at Pottery Mound; instead, almost all of the diagnostic rim sherds have the hornblende latite temper typical of the Galisteo-Tonque area. Also, some of the red paste, basalt tempered Rio Grande Glaze Ware found at Pottery Mound may have come contemporary villages along the Rio Grande, where identical pottery types were made. My recent work on pottery from Alameda, Chamisal, and Montaño Bridge Pueblos has documented glazeware and utility ware assemblages which resemble those from Pottery Mound in terms of both outward appearance and gross constituent materials. Typological studies (such as the one at the heart of my work) will not necessarily distinguish red-paste, basalt-tempered pottery made at Pottery Mound versus that obtained from nearby Rio Grande pueblos, where the same types were made with similar raw materials. More detailed (and costly) studies would be required to make such determinations.

However, it *can* be said that Rio Grande Glaze Ware with tan, brown or other colored pastes and non-basalt tempers such as sand, granitic rock, or mica, were *not* made at Pottery Mound, even when superficially those vessels resembled those made at the site.

The more "exotic" wares and types are easier to spot using surface attributes, constituent materials, or both. The Acoma-Zuni area painted types (Kwakina, Pinnawa, and Kechipawan Polychrome) and the companion utility comprise the largest single group of intrusive wares at Pottery Mound. The second most common intrusive group is pottery from Hopi, again including painted types (Jeddito Black-on-yellow and Sikyatki Polychrome) and utility pottery (both plain and corrugated). The presence of Western utility types, in addition to painted vessels, certainly bears scrutiny.

The surface collections yielded 1,086 sherds from the Acoma-Zuni and Hopi areas, 6 percent of the total (Table 4). More significantly, the Western imports make up 96 percent of the 1,133 non-local sherds. The 407 painted Acoma-Zuni sherds are 80 percent of the 511 non-local decorated sherds; the 84 Hopi decorated sherds account for another 16 percent of those sherds. In other words, Western wares completely dominate the assemblage of non-local painted sherds. The Western wares are, in turn, dominated by sherds from the Acoma-Zuni area, which are roughly six times as common as Hopi sherds (926 versus 180) (Table 4). The Hopi pottery is important in part because it was carried a great distance, but it cannot compare numerically to the Acoma-Zuni area wares.

During my analysis I noticed that the Western Pueblo utility sherds show almost no soot smudging, which was puzzling at first. In the Ceramic period Southwest, cooking typically involved corrugated or plain utility jars used on an open fire, leading to soot smudging and other discoloration. The local, basalt-tempered utility sherds found at Pottery Mound are always blackened in this fashion. The lack of such deposits on the outsides of Acoma-Zuni and Hopi area utility sherds suggests that they were not used for cooking. I suggest that instead, new utility vessels were used as containers for trade goods being brought east. After arrival, these vessels could have been re-used at Pottery Mound for various purposes other than cooking. The Western Pueblo utility pots definitely were not being imported as a matter of necessity, since the Pottery Mound potters produced similar vessels by the thousands, and then used them over fires.

The non-western imports make up only 4 percent of the intrusive pottery in the surface collection. The category includes Pueblo III types (Socorro and Santa Fe Black-on-white and Los Lunas Smudged) that were made nearby even if they were not made on-site, and other sherds are White Mountain Red Ware from the Little Colorado River area, so the percentage of genuinely exotic but non-western types is even smaller than indicated by the number just provided. The four sherds of biscuit ware, from the northern Rio Grande, signal a very weak connection to the north as opposed to the west. Perhaps more unexpected is the lack of glazeware sherds from the Tonque-Galisteo population center to the northeast. Only eight sherds of Espinoso Glaze Polychrome contain the hornblende latite characteristic of glazeware vessels produced in that area (see Schleher 2010b; Shepard 1942; Warren 1969).

Although Frank Hibben (1966) saw strong connections between Pottery Mound and Mexico, ceramic evidence of this connection is lacking. No Mexican sherds were found in the collections from the 1979 stratigraphic test or the surface collections. Five polychrome sherds found at the site during Hibben's excavations (David Phillips, personal communication) are the are the only Casas Grandes pottery known from the site.

Looking in the reverse direction, how much pottery flowed from Pottery Mound to other districts? Evidently, very little. As I mentioned, the close-in trade of Rio Grande glaze and utility types is not well understood. Zooming out to a bigger picture, the movement of pottery from Pottery Mound was not on a par with the movement of pottery into the site. To the west, essentially no Rio Grande Glaze Ware is reported from the excavated proto-Hopi sites such as Awatovi, Jeddito, and Homolovi. Based on similarly negative evidence, the Rio Grande painted types did not even make it to the Acoma-Zuni area villages of the Pueblo IV period. In summary, the trade route (or routes) that brought so much pottery from western production centers into

Pottery Mound was a one-way street, unless perishable goods (such as cloth, baskets, and hides) were flowing westward in exchange.

Ceramic exports to the east and north were almost as limited. Very little Pottery Mound Glaze Polychrome reached the villages along the Rio Grande. Several sherds of this type were identified at Valencia Pueblo (Franklin 1997)—a site as close to Pottery Mound as any along the river might have been, so the presence of a few sherds of its signature type is not surprising. Elsewhere along the great river, Pottery Mound Glaze Polychrome is all but nonexistent. At one point a few sherds from Chamisal Pueblo were typed as Pottery Mound polychrome, but my analysis showed them to be other glazeware types. Imports of micaceous utility made along the Rio Grande illustrate that such ceramic trade did exist between the site and the valley to the east, but here again, the flow seems to have been into Pottery Mound rather than out of it.

In a similar vein, the extensive and sustained transmission of Western Pueblo pottery to Pottery Mound seems to have halted there, instead of continuing to the villages along the Rio Grande. There are verified sherds of Kwakina Polychrome and Pinnawa Glaze-on-white from Chamisal and Tijeras Pueblo, but very few. Hopi yellow ware sherds are just as scarce in the middle Rio Grande area, except at Pottery Mound; no more than a handful of Hopi sherds has been found at any major pueblo along the Rio Grande. It is striking that Western Pueblo pottery dominates the assemblage of imported sherds at Pottery Mound, and is almost as rare as hen's teeth along the Rio Grande, even though the site is just 17 km west of the river. The strong eastern flow of pottery into Pottery Mound, and the apparent lack of flow from pottery there eastward, deserves careful study in the future (see also Franklin and Schleher 2012).

The preceding remarks had mostly to do with the intensity of exchange between Pottery Mound and other parts of the Pueblo world. It is also instructive to look at the distances involved. Table 10 lists approximate distances from Pottery Mound to modern towns in regions from which Pottery Mound received trade pottery. The extensive network which stretched in all directions touched at Pueblo IV centers as far as 600 km away. There is no direct relationship between distance and the extent of trade, as one would expect from a simple fall-off model: the amount of pottery imported from Acoma, Zuni, and Hopi indicate a thriving, sustained east-west corridor of exchange while imports from centers that were as close or closer (the Galisteo and Española Basins, for example) indicate less sustained interaction. Clearly, cultural boundaries and connections were more important in determining Pottery Mound's ceramic trading partners than purely economic considerations such as distance of travel.

Trade in ceramic raw materials, especially glaze paint pigments and slip clays, must also have occurred. Based on studies by Habicht-Mauche (1995) and Huntley (2008), the lead and copper used in glaze paints were mined in several different areas. Thus far no one has documented the sources for Pottery Mound glaze paint, but based on results from other sites, the Cerrillos or Magdalena mining districts (or both) are the likely candidates.

Table 10. Distances to Sources of Imported Pottery.
(Source: Franklin 2010b. Approximate distances by road, as a proxy for foot travel.)

Modern Town	Local Wares	Distance, Miles	Distance, Km
Acoma Pueblo, N.M.	Glaze and utility	67	108
Zuni Pueblo, N.M.	Glaze and utility	179	289
Second Mesa, Az. (Hopi)	Painted and utility	257	415
St. Johns, Az.	White Mtn. Red Ware	235	379
Tijeras, N.M.	Glaze A	50	81
Santa Fe, N.M.	Glaze A–D	90	145
Galisteo, N.M.	Glaze	95	177
Española, N.M.	Biscuit ware	115	185
Casas Grandes, Mexico	Casas Grandes	381	615

In any event, the carrying of large quantities of pottery over long distances seems astonishing to the modern mind. The residents of Pottery Mound did not have a practical need for imported pots—they could make as many as they wished—so on the surface it is a case of "taking coals to Newcastle." Instead, pottery exchange must have been for reasons other than direct utility. As I mentioned earlier, I suspect that they were used to transport commodities; candidates include foodstuffs (piñon nuts, for example; they are a valued traditional food not readily available near the site), valuables such as shell, and raw materials (obsidian from Mt. Taylor is common on the site surface, and Zuni Mountain spotted chert also occurs). Pots could have joined with bags and baskets to hold many kinds of items moving along established routes.

The Impact of Ceramic Imports on Local Production

The large quantities of Western imports had an effect on local ceramic practices. Locally made glazeware types frequently incorporated design motifs and rim shapes common to both Acoma-Zuni and Hopi wares (Fewkes 1973). Some of these elements are: dragonflies, stylized birds, angled and beveled bowl rims, and contrasts between red and white surfaces. The last element is typical of Kwakina Polychrome, the most numerous of the imported Acoma-Zuni types; it was expressed locally on San Clemente Glaze Polychrome, in which one bowl surface (either the interior or the exterior) is slipped white and the other is slipped red.

My earlier analysis (Franklin 2007) recorded five design variants of San Clemente, based on which surface was slipped red or white and on the type of white slip (creamy or chalky). Earlier, Eckert (2003) recognized one of these variants as "Hidden Mountain Polychrome," also arguing for local copying of Western contrasting slips. The chalky white slip on about one-third of the San Clemente Glaze Polychrome sherds is typical of Cibola White Ware and of later, Acoma and Zuni pottery made up to the present. The clay for the chalky white slip may have been brought in from the Acoma area, as no such clay is available at or near Pottery Mound. (The source clay for the creamy white slip is unknown, but also not local.) As Pottery Mound Glaze Polychrome developed out of San Clemente Glaze Polychrome, the new type took the contrast between

slipped areas a step further; Pottery Mound Glaze Polychrome can have areas of red, white, yellow, or tan slip on opposite vessel surfaces or even the same surface.

If San Clemente and Pottery Mound Polychrome are the local types that show the strongest concessions to Western Pueblo ceramic design (in the contrasting slips of San Clemente, and in the painted motifs of Pottery Mound; C. Schaafsma 2007), they nevertheless remained embedded in Rio Grande Glaze Ware production practices, and could never be confused with the Western Pueblo types. Helen Crotty (1995, 2007) has made similar comments regarding the kiva murals for which Pottery Mound is best known. Although western elements are undeniably present in the kiva art (Crotty 2007; Vivian 2007; see also Hibben 1975), as well as in rock art (P. Schaafsma 2007) and textiles (Hays-Gilpin and Leblanc 2007), these elements were part of an amalgam that derived its origins and inspiration from multiple directions rather than from a single source (Hays-Gilpin and Leblanc 2007). A new, synergistic art style was the result.

Given the few imports of Biscuit Ware pottery, that tradition presumably had little impact on local ceramic practice. The lack of such pottery extends to other sites of the middle Rio Grande region; for some reason, Biscuit Ware was rarely brought into that region, even though Rio Grande Glaze Ware is a common trade ware in Biscuit Ware villages.

I was more surprised by the lack of ceramic exchange with villages of the Tonque-Galisteo Basin district. This lack of exchange is matched by a lack of stylistic similarity, at least when it comes to bowl rims. While the Tonque-Galisteo district and the middle Rio Grande area followed parallel courses of ceramic evolution during Glaze A times, based on current research the northern and southern glazeware productions diverged about A.D. 1425. In particular, the south end of the glazeware production area seems to have skipped the shift to Glaze B rims, instead continuing to produce bowls that "type" to Glaze A.

Between A.D. 1200 and 1450, the site if Paquimé in Chihuahua must have been one of the most influential religious centers in the Southwest, so it is fair to ask whether that center had a visible influence on Pottery Mound. As we saw, evidence for direct ceramic exchange with the Casas Grandes culture is limited to four sherds. Still, the interactions may have been of a different kind. Hibben's "salvage" work at the site supposedly uncovered a macaw burial (unfortunately, never verified). A copper bell fragment was found in the 1979 stratigraphic test. Macaw motifs on pottery and images in the kiva murals also suggest links to the south, but no more than for other Pueblo IV period villages in the U.S. Southwest (David Phillips, personal communication). For now, Hibben's (1966) arguments for strong ties to Mexico cannot be sustained.

Implications for Site Structure

Even based on the limited information provided by surface collections and the 1979 stratigraphic test, ceramic distributions across the site are non-random. As we have seen, both the Acoma-Zuni and the Hopi pottery are most concentrated in Pottery Mound's South Midden. The concentration of Hopi decorated pottery, and especially of Hopi utility pottery, in the southwest part of the site is indicated by two independent studies, my own surface collections as described earlier in this report, and Phillips' surface collections described in Appendix B. In contrast,

Pottery Mound Polychrome—inspired by Hopi iconography but locally made—is most concentrated in the site's North Midden. Given the evidence of differences in kiva layout between the northeast and southwest parts of the site (Adler 2007; Crotty 2007), perhaps we should not be surprised.

One possibility, considered by Frank Hibben but first systematically examined by Suzanne Eckert (2003, 2008), is that part of the settlement was occupied by a contingent from Hopi. (Even under this scenario, the Hopi are unlikely to have founded Pottery Mound, given the absence of Hopi pottery from the lowest levels of the 1979 test.) The existence of a Hopi contingent would account for the presence of both decorated and utility pottery from the Hopi area, as well as for the Sikyatki designs seen in the site's kiva murals and on Pottery Mound Polychrome. Perhaps there is merit in Florence Hawley Ellis' statement that "There is a Hopi tradition of some of the Keres from their area having moved to Acoma, and our guess is that Pottery Mound, on the Puerco, became the home of these migrants who added Hopi pottery and Hopi style in kiva murals to the traits of the Acoma nucleus they were joining." (Ellis 1967:40).

Still, arguments for immigrant populations need to rest on many lines of evidence. In 1958, Rouse proposed criteria for the acceptance of migration hypotheses that I applied to the Salado presence in southern Arizona (Franklin and Masse 1976; see also Clark 2001; Clark and Lyons 2012). While the past studies of Pottery Mound pottery and kiva murals are promising, we have not yet considered all possible lines of evidence relating to the issue. In particular, the additional forms of data have not been matched to test expectations such as those of Rouse and Clark. As a consequence, we should still entertain other hypotheses for the large amounts of Western Pueblo pottery within the site.

One possibility is that Pottery Mound served as a trading hub connecting the Western Pueblo world and the Rio Grande Valley (a thought consistent with its position just west of the Rio Grande). Goods transported to the site from the west may have arrived in Western Pueblo pots (and in other containers, of course), which were discarded before the goods continued eastward. If one part of the site served as a receiving area for Western Pueblo goods, the pottery discarded during this process might well be concentrated in one midden within the site.

A different possibility is that non-random distributions of pottery are due to ceremonial activities that involved exchanges of material goods. Modern analogs include the "corn dances" held at the Rio Grande Pueblos on fixed feast days, when public dances and other religious activities are accompanied by sale or barter of goods at booths erected in otherwise open areas. Furthermore, presents including pottery are given to hosts who can be long time friends. Archaeologists have considered the possible tangible evidence of feasting (e.g., Graves and Spielmann 2000; Mills 2004; Spielmann 2004) and based on the analogy provided by corn dances, exchange of pottery might involve relationships ranging from the personal or familial to long-distance ones with explicit economic motivations. At Pottery Mound, such feasting-related exchange might help explain the concentration of exotic pottery types in certain parts of the site.

Finally, I will raise the question of specialization in the making or use of Pottery Mound pottery. "Specialization" implies various things, including the making of certain types or styles by only certain potters and the use of certain vessels for specific purposes and in specific social contexts

(Eckert 2003, 2007). The surface data do little to shed light on the subject, but a few points are worth making. First, the abundance of styles visible on the locally made pottery suggests that not all styles were made by all potters. For example, I recognized five styles of San Clemente Glaze Polychrome based on slip placement, creamy versus chalky white slip, and rim form (Franklin 2008; see also Eckert 2003, 2008). Were there certain potters (or families of potters) who maintained their "sub-traditions" identifiably separate from their neighbors' creations? Was Pottery Mound Glaze Polychrome (produced nowhere else, and found almost nowhere else) produced by only a handful of potters in a few families? And if so, can we say that they "specialized" in its manufacture?

In suggesting this, I am reminded of Margaret and Luther Gutierrez of Santa Clara Pueblo, who developed a decorative style that became a family trademark. Perhaps the varied artistic expression at Pottery Mound represents some of the earliest cases of personal or familial excellence rising above the norm. Additional study of potential "microtraditions" within Pottery Mound painted pottery should be fruitful.

Concluding Remarks

The study of 18,224 potsherds from Pottery Mound confirms and extends our knowledge about this important prehistoric settlement. Although Pueblo IV period villages are known for their output of ceramics, and for an intensity of exchange unknown in earlier Pueblo prehistory, Pottery Mound stands out.

Pottery Mound's potters produced a half-dozen major types of decorated pottery, many of them concurrently. This variety in itself marks a departure from earlier centuries, during which only one or two painted wares and one utility ware were made by any group at any given time. The sheer quantity of local output would more than satisfy the daily requirements of the households in residence, and clearly went beyond practical necessity. This suggests that ceramics were employed as a medium of exchange, not just as containers. Moreover, the decorative variations on the glazeware theme suggest a thriving and experimental aesthetic process.

The villagers also imported large quantities of pottery, of various kinds, from distant locations. I suspect that the town was a trading hub. Pottery flowed into Pottery Mound, primarily from the west, but the contents of those pots may have been just as important as the pots themselves. Or perhaps the extensive trade relations served purposes beyond the movement of goods; perhaps they cemented social and political ties over a vast region, providing a measure of stability not attainable otherwise.

The non-random distribution of some imported ceramics has implications for site structure. At the very least, site structure was non-uniform, as the distribution of kiva attributes (Adler 2007; Crotty 2007) suggests. To recall one example, Hopi pottery did not become more concentrated in the South Midden for no reason. Perhaps a Hopi contingent lived nearby; perhaps trade-related activities took place nearby; perhaps ceremonial visits by Hopi took place nearby. (Or perhaps the pattern is due to some mix of those factors.) It is clear that we are only beginning to understand the implications of the data from Pottery Mound, and that additional studies are (as

always) needed. In any event, the surface analysis, combined with other recent studies of the Pottery Mound ceramic assemblage, allow us to pose new questions and suggest what direction the future studies should take.

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Appendix A

IDENTIFICATION AND COUNTS OF H. P. MERA'S POTTERY MOUND SURFACE COLLECTION[1]

David H. Snow

The following types and counts were provided from the surface collection from Pottery Mound (LA 416) made by Dr. Harry Mera during the 1930s. A note on the accompanying slip in the sherd drawer, in Dr. Mera's handwriting, states that "An intensive search yielded rim forms from A to E with other sherds showing certain techniques that point very strongly to Group F." Neither Linda Cordell nor I observed the "certain techniques" indicated; it is possible that Dr. Mera left those sherds at the site. No effort was made to identify temper. Our identifications of bowl (only) rim forms and their frequency in Dr. Mera's collection follow.

Agua Fria Glaze-on-red with direct rims (28)
Agua Fria with overall orange slips and direct rims (3); the color is similar to that of Heshoutauthla Polychrome.
Agua Fria with direct rims and contrasting light to dark red slips (17); the lighter colored slip is consistently on the interiors of bowls.
Agua Fria Glaze-on-red with a C rim (1)
Cieneguilla Glaze-on-yellow (7)
Cieneguilla Glaze Polychrome (2)
San Clemente Glaze Polychrome (17)
San Clemente with a B rim (1)
San Clemente with C rims (8)
Pottery Mound Polychrome with direct rims (13)
Pottery Mound Polychrome with B rims (3)
Pottery Mound Polychrome with C rims (25)
Pottery Mound Polychrome with exaggerated angular rims, à la Mera's Kuaua Glaze Polychrome (6)
Largo Glaze Polychrome (1)
Largo Glaze-on-yellow (5)
Kuaua Glaze-on-red (1)
Espinoso Glaze Polychrome (10)
San Lazaro Glaze Polychrome (11)
Puaray Glaze Polychrome (7)
Acoma Gamma–Delta rim (1)
Kechipawan Glaze-on-white (4)
Kwakina Polychrome (6)

[1] Based on notes from an examination of the sherds, at the Laboratory of Anthropology, Santa Fe, on October 16, 2007 (Snow 2007a). Linda Cordell was also present.

Two bowl sherds with carbon-based-black on white, and red elements (interior). One sherd is quite thick and reminiscent of Biscuit B; the other is quite thin. The designs are not readily identifiable but the former might be called Biscuit Polychrome (!). These do not appear to be from historic Tewa series vessels, but that possibility remains.

Uncounted sherds include a minimum 10 to 15 Socorro Black-on-white; ditto Biscuit B; and 15-plus Hopi yellow varieties.

For the Rio Grande rims, 49 percent are A forms; 6.5 percent are B; 33 percent are C, 7 percent are D, and 4.5 percent are E. Pottery Mound Glaze Polychrome is here counted as a Glaze C type, regardless of rim form. The percentages could be recalculated according to the rim forms indicated above.

Appendix B

HOPI SHERDS SURFACE COLLECTION DATA

David A. Phillips, Jr.

A sample of Hopi sherds was collected separately from the systematic sample and midden transects supervised by Hayward Franklin. I supervised the collection of the separate sample, assisted by various members of the Pottery Mound volunteer crew. The immediate goal was to enlarge the sample of Hopi sherds from the site surface.

On multiple occasions we wandered over the site, in no particular pattern, emulating (as best we could) a statistical random walk. When we encountered a Hopi sherd on the site surface, we point provenienced it using a total station (operated by Jean Ballagh, assisted by Ellen Herbertson) and collected it. Sherds within 10 cm of each other were collected as a single point provenience. A few unrelated items were also collected (Phillips et al. 2011, 2012).

In the lab, conjoining sherds were counted as one sherd. In the sixth column of Table B.1, "D" indicates a Hopi decorated ware sherd (Jeddito Yellow Ware) and "U" indicates a Hopi utility ware sherd (Awatovi Yellow Ware). Some sherds lacking paint were classified as "D" sherds based on their paste, lack of temper, and polished surfaces.

The effort yielded 518 Hopi sherds (Table B.1), one of which could not be further classified. (The subsequent tabulations exclude this sherd.) Of the 517 classified sherds, 384 are decorated ware (74 percent) and 133 are utility ware (26 percent). The high frequency of Hopi sherds at Pottery Mound, relative to other sites in the area, begs explanation, but so does the fact that one-quarter of the Hopi sherds in the sample are utility ware sherds.

Table B.2 breaks down the distribution of the sherds in terms of 25 by 25 m squares, based on the master site grid. To interpret this information, it is necessary to have a sense of the surface distribution of sherds in general. To that end, I developed a protocol to estimate the frequency of surface sherds across the site, based on Franklin's systematic collection. Given the small size of that sample (nominally, 1 m^2 collected per 625 m^2 of site surface) and various localized disturbances to the site surface, I characterized the site surface in terms of just four areas, each a quadrant of the site. Based on our current understanding of Pottery Mound (Phillips and Ballagh 2010, Figure 6), the site was divided along the E650 and N500 grid lines. In other words, the northwest quadrant is west of E650 and north of N500, the northeast quadrant is east of E660 and north of N500, the southeast quadrant is east of E650 and south of N500, and the southwest quadrant is west of E650 and south of N500.

I then broke the site surface into a series of 25 by 25 m "virtual squares" with the Franklin 1 by 1 m collection units at their centers (e.g., for the 1 by 1 m unit at E700 N500, the corresponding virtual square extends from E687.5 to E712.5 and from N487.5 to N512.5). The observed sherd density for the corresponding Franklin unit was then extrapolated to the entire virtual square.

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
Begin Contents of Box 26061						
2009.11.2	090224.15	613.424	519.430	99.004	D	(1)
2009.11.3	090224.16	606.408	542.145	98.613	D	
2009.11.4	091124.8	659.109	499.172	99.174	D	
2010.55.1	100409.1	525.875	511.015	97.776	U	
2010.55.2	100409.2	538.776	522.265	97.753	D	
2010.55.3	100409.3	538.386	523.028	97.755	D	
2010.55.4	100409.4	540.698	528.494	97.870	U	
2010.55.5	100409.5	545.325	531.636	98.060	D	
2010.55.6	100409.6	545.313	530.171	98.002	D	
2010.55.7	100409.7	545.780	529.904	98.019	D	
2010.55.8	100409.8	548.015	529.117	98.052	U	
2010.55.9	100409.9	548.599	528.288	98.042	D	
2010.55.10	100409.10	550.017	529.308	98.064	D	
2010.55.11	100409.11	557.601	522.572	98.090	D	
2010.55.12	100409.12	560.946	522.753	98.109	U	
2010.55.13	100409.13	563.068	527.508	98.194	D	
2010.55.14	100409.14	578.438	521.739	98.362	U	
2010.55.15	100409.15	577.405	538.583	98.384	D	
2010.55.16	100409.16	579.329	550.706	98.709	U	
2010.55.17	100409.17	562.524	554.969	98.152	D	(2)
2010.55.18	100409.18	560.697	553.258	98.183	D	
2010.55.19	100409.19	559.391	552.748	98.203	U	(3)
2010.55.20	100409.20	554.801	563.079	97.745	D	
2010.55.21	100409.21	548.957	565.317	97.626	D	
2010.55.22	100409.22	549.342	566.241	97.585	D	
2010.55.23	100409.23	556.805	561.905	97.773	D	
2010.55.24	100409.24	556.819	523.155	98.081	D	
2010.55.25	100409.25	555.876	523.088	98.048	D	
2010.55.28	100409.28	596.381	485.529	97.712	U	(4)
2010.55.29	100409.29	596.443	485.532	97.725	U	
2010.55.30	100409.30	599.105	484.827	97.862	U	
2010.55.31	100409.31	601.110	486.556	98.101	U	
2010.55.32	100409.32	606.962	481.706	98.026	D	
2010.55.33	100409.33	611.141	476.238	98.128	D	
2010.55.34	100409.34	610.818	476.504	98.109	D	
2010.55.35	100409.35	614.589	470.507	98.087	D	
2010.55.36	100409.36	614.633	470.686	98.087	D	
2010.55.38	100409.38	621.745	471.741	98.415	D	(5)
2010.55.40	100409.40	640.974	480.578	99.143	D	(6)
2010.55.41	100409.41	641.125	480.731	99.139	D	
2010.55.42	100409.42	641.113	480.900	99.150	D	

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
2010.55.43	100409.43	640.059	480.804	99.198	D	
2010.55.44	100409.44	639.684	480.914	99.188	U	
2010.55.45	100409.45	639.625	480.556	99.167	D	
2010.55.46	100409.46	639.320	481.631	99.225	D	
2010.55.47	100409.47	639.356	481.705	99.225	D	
2010.55.49	100409.49	638.013	485.088	99.342	U	(7)
2010.55.50	100409.50	638.118	485.358	99.390	U	
2010.55.51	100409.51	637.943	489.712	99.597	D	
2010.55.52	100409.52	630.961	490.845	99.662	D	
2010.55.53	100409.53	619.768	491.660	98.944	D	
2010.55.54	100409.54	622.611	497.096	98.796	D	
2010.55.55	100409.55	621.968	495.522	98.889	D	
2010.55.56	100409.56	621.733	494.460	98.925	D	
2010.55.57	100409.57	613.575	487.681	98.673	D	
2010.55.58	100409.58	613.432	487.855	98.668	D	
2010.55.59	100409.59	564.437	485.901	97.603	U	
2010.55.60	100409.6	564.465	485.841	97.602	U	
2010.55.61	100409.61	564.378	485.557	97.582	U	
2010.55.62	100409.62	562.773	485.596	97.575	D	
2010.55.63	100409.63	566.764	486.027	97.612	U	
2010.57.1	100416.1	658.180	507.683	98.736	D	
2010.57.2	100416.2	658.294	507.230	98.768	D	
2010.57.3	100416.3	649.325	510.697	99.457	D	
2010.57.4	100416.4	649.815	510.889	99.481	D	
2010.57.5	100416.5	640.906	513.604	99.079	U	1 of 2
2010.57.5	100416.5	640.906	513.604	99.079	U	2 of 2
2010.57.6	100416.6	643.586	520.845	99.247	D	
2010.57.7	100416.7	643.995	521.382	99.352	D	
2010.57.8	100416.8	644.834	523.363	99.257	D	
2010.57.9	100416.9	638.938	522.439	99.429	U	
2010.57.10	100416.10	639.365	521.838	99.373	D	
2010.57.12	100416.12	635.594	524.140	99.580	U	
2010.57.13	100416.13	647.519	522.806	99.178	D	1 of 2
2010.57.13	100416.13	647.519	522.806	99.178	D	2 of 2
2010.57.14	100416.14	648.338	522.544	99.150	D	
2010.57.15	100416.15	655.470	524.331	98.719	D	
2010.57.16	100416.16	656.846	524.345	98.580	D	
2010.57.17	100416.17	657.313	524.590	98.490	U	
2010.57.18	100416.18	657.551	524.667	98.457	D	
2010.57.19	100416.19	658.462	524.271	98.274	D	
2010.57.20	100416.20	658.138	527.125	98.075	D	
2010.57.21	100416.21	659.718	527.628	97.728	D	
2010.57.22	100416.22	664.470	538.316	97.312	D	

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
2010.57.23	100416.23	664.811	538.077	97.288	D	
2010.57.24	100416.24	668.591	545.295	97.175	D	
2010.57.25	100416.25	674.612	537.680	97.032	U	
2010.57.26	100416.26	674.988	534.657	97.038	D	
2010.57.27	100416.27	675.260	534.632	97.066	D	
2010.57.28	100416.28	676.869	533.836	96.950	D	
2010.57.29	100416.29	688.121	521.481	96.871	D	
2010.57.30	100416.30	689.461	522.563	96.989	D	
2010.57.31	100416.31	689.730	526.254	96.926	D	
2010.57.32	100416.32	690.801	498.168	97.333	D	
2010.57.33	100416.33	674.318	489.864	98.502	D	
2010.57.35	100416.35	679.523	486.479	98.234	D	
2010.57.36	100416.36	681.175	469.784	97.963	D	
2010.57.37	100416.37	682.373	468.055	97.856	D	
2010.57.38	100416.38	684.200	462.688	97.708	D	
2010.57.39	100416.39	693.069	466.663	97.451	D	
2010.57.40	100416.40	695.902	469.632	97.365	D	
2010.57.41	100416.41	702.079	471.096	97.116	D	
2010.57.42	100416.42	702.432	471.342	97.118	D	
2010.57.43	101119.3	681.465	475.241	98.065	D	
2010.57.44	101119.4	682.034	475.624	98.097	D	
2010.57.45	101119.5	682.674	474.829	98.018	D	1 of 2
2010.57.45	101119.5	682.674	474.829	98.018	D	2 of 2
2010.57.46	101119.6	682.760	478.261	98.124	D	
2010.57.47	101119.7	663.025	502.853	98.433	D	
2010.57.48	101119.8	671.152	503.836	98.009	U	
2010.57.49	101119.9	694.069	481.581	97.323	D	1 of 2
2010.57.49	101119.9	694.069	481.581	97.323	U	2 of 2
2010.57.50	101119.10	695.346	479.617	97.239	U	
2010.57.51	101119.11	696.177	479.570	97.164	D	
2010.57.52	101119.12	701.094	478.490	97.065	D	
2010.57.53	101119.13	700.340	472.377	97.187	D	1 of 3
2010.57.53	101119.13	700.340	472.377	97.187	D	2 of 3
2010.57.53	101119.13	700.340	472.377	97.187	D	3 of 3
2010.57.54	101119.14	700.531	471.977	97.208	D	
2010.57.55	101119.15	699.903	471.679	97.161	D	
2010.57.56	101119.16	700.003	470.773	97.215	D	
2010.57.57	101119.17	700.123	469.618	97.282	U	
2010.57.58	101119.18	700.596	468.073	97.332	D	
2010.57.59	101119.19	699.678	469.961	97.243	D	1 of 3
2010.57.59	101119.19	699.678	469.961	97.243	D	2 of 3
2010.57.59	101119.19	699.678	469.961	97.243	D	3 of 3
2010.57.60	101119.20	700.783	469.594	97.320	D	

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
2010.57.61	101119.21	698.683	466.559	97.286	D	
2010.57.62	101119.22	698.424	466.010	97.309	D	
2010.57.63	101119.23	688.151	460.568	97.308	D	
2010.57.64	101119.24	677.138	472.986	98.076	D	
2010.57.65	101119.25	664.588	475.846	98.504	U	
2010.57.66	101119.26	661.139	476.369	98.579	D	
2010.57.67	101203.14	538.834	521.131	97.729	U	Misfired
2010.57.68	101203.15	537.271	521.992	97.729	D	
2010.57.69	101203.16	537.931	523.614	97.743	D	
2010.57.70	101203.17	537.991	524.419	97.734	U	
2010.57.71	101203.18	538.244	533.078	97.862	D	
2010.57.72	101203.19	536.045	536.039	97.829	D	
2010.57.73	101203.20	536.576	540.212	97.873	D	
2010.57.74	101203.21	535.797	540.535	97.861	D	
2010.57.76	101203.23	528.921	565.272	97.639	D	(8)
2010.57.77	101203.24	537.384	560.177	97.981	D	
2010.57.78	101203.25	538.290	559.370	98.039	U	
2010.57.79	101203.26	556.412	564.704	97.592	D	1 of 2
2010.57.79	101203.26	556.412	564.704	97.592	D	2 of 2
2010.57.80	101203.27	555.636	564.401	97.654	U	
2010.57.81	101203.28	563.478	565.743	97.611	D	
2010.57.82	101203.29	574.899	571.339	97.425	D	1 of 2
2010.57.82	101203.29	574.899	571.339	97.425	D	2 of 2
2010.57.83	101203.30	574.893	555.379	99.058	D	
2010.57.84	101203.31	599.099	504.818	98.166	D	
2010.57.85	101203.32	598.813	505.318	98.164	D	
2010.57.86	101203.33	604.499	505.842	98.383	U	
2010.57.87	101203.34	605.800	505.218	98.468	D	
2010.57.88	101203.35	609.063	508.062	98.683	D	
2010.57.89	101203.36	611.327	509.169	98.812	D	
2010.57.91	101203.38	616.340	509.045	99.178	D	(9)
2010.57.92	101203.39	617.393	507.692	99.197	D	
2010.57.93	101203.40	631.796	534.323	98.829	U	
2010.57.94	101203.41	615.648	555.886	98.226	U	
2010.57.95	101203.42	610.652	554.234	98.282	U	
2010.57.96	101203.43	641.312	538.777	98.771	D	
2010.57.98	101203.45	640.272	536.016	99.206	D	(10)
2010.57.99b	101203.46	640.814	534.935	99.322	D	(11)
2010.57.100	101203.47	635.066	519.854	99.298	U	
2010.57.101	101203.49	617.328	506.015	99.142	D	1 of 2 (12)
2010.57.101	101203.49	617.328	506.015	99.142	D	2 of 2
2010.57.102	101203.50	623.545	519.930	99.320	D	
2010.57.103	101203.51	633.635	492.782	99.782	D	

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
2010.57.104	101203.52	644.381	490.379	99.550	D	
2011.100.1	110421.10	663.642	482.724	99.804	D	
2011.100.2	110421.11	663.043	482.788	99.798	D	
2011.100.3	110421.12	662.900	481.700	99.758	U	
2011.100.4	110421.21	665.802	482.452	98.800	D	
2011.100.5	110421.22	663.908	485.215	99.131	U	
2011.100.6	110421.23	662.388	485.400	99.030	U	
2011.100.7	110421.24	658.247	486.963	99.340	D	
2011.100.8	110421.25	657.638	487.993	99.524	U	
2011.100.9	110421.26	655.137	489.552	99.917	U	
2011.100.10	110421.27	654.357	491.205	99.914	U	
2011.100.11	110421.28	627.541	487.619	99.390	U	1 of 2
2011.100.11	110421.28	627.541	487.619	99.390	U	2 of 2
2011.100.12	110421.29	612.164	482.146	98.257	D	
2011.100.13	110421.30	601.189	486.266	98.054	U	
2011.100.14	110421.31	601.192	486.516	98.049	U	
2011.100.15	110421.32	600.763	487.199	98.144	D	
2011.100.16	110421.33	599.933	488.192	98.095	U	
2011.100.17	110421.34	599.501	487.168	97.970	D	
2011.100.18	110421.35	600.740	486.280	98.052	U	
2011.100.19	110421.36	601.036	486.284	98.063	U	
2011.100.20	110421.37	601.242	486.227	98.060	U	
2011.100.21	110421.38	600.649	487.035	98.062	U	
2011.100.22	110421.39	601.017	487.445	98.124	U	
2011.100.23	110421.40	600.668	488.377	98.184	U	
2011.100.24	110421.41	600.510	488.099	98.127	U	
2011.100.25	110421.42	600.592	488.198	98.141	U	
2011.100.26	110421.43	600.444	488.299	98.150	U	(13)
2011.100.27	110421.44	599.962	489.288	98.106	U	
2011.100.28	110421.45	599.901	488.576	98.086	U	1 of 2
2011.100.28	110421.45	599.901	488.576	98.086	U	2 of 2
2011.100.29	110421.46	599.168	488.202	98.010	U	
2011.100.30	110421.47	598.736	488.486	97.988	U	
2011.100.31	110421.48	598.519	488.320	97.964	D	
2011.100.32	110421.49	597.262	489.391	97.862	D	
2011.100.33	110421.50	596.942	489.958	97.856	D	1 of 2
2011.100.33	110421.50	596.942	489.958	97.856	D	2 of 2
2011.100.34	110421.51	597.806	486.742	97.856	U	
2011.100.35	110421.52	599.446	485.554	97.848	U	
2011.100.36	110421.53	598.573	485.605	97.803	U	
2011.100.37	110421.54	598.225	484.626	97.785	U	
2011.100.38	110421.55	597.470	483.849	97.682	U	
2011.100.39	110421.56	595.724	483.659	97.641	D	

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
2011.100.40	110421.57	597.103	484.524	97.719	U	
2011.100.41	110421.58	598.386	485.649	97.867	U	
2011.100.42	110421.59	597.399	485.789	97.803	U	
2011.100.43	110421.60	598.001	486.394	97.852	U	1 of 2
2011.100.43	110421.60	598.001	486.394	97.852	U	2 of 2
2011.100.45	110421.62	598.458	486.686	97.894	U	
2011.100.47	110421.64	599.160	487.393	97.975	U	1 of 2
2011.100.47	110421.64	599.160	487.393	97.975	U	2 of 2
2011.100.48	110421.65	598.361	487.402	97.900	D	1 of 2
2011.100.48	110421.65	598.361	487.402	97.900	U	2 of 2
2011.100.49	110421.66	598.667	488.031	97.990	U	
2011.100.50	110421.67	598.776	487.830	97.983	D	
2011.100.51	111021.1	580.879	503.551	98.454	D	
2011.100.52	111021.2	583.374	507.626	98.714	D	
2011.100.54	111021.4	578.292	520.919	98.347	D	
2011.100.55	111021.5	578.077	520.706	98.359	D	
2011.100.56	111021.6	563.008	528.115	98.206	D	
2011.100.57	111021.7	562.335	528.280	98.180	D	
2011.100.59	111021.9	563.386	528.205	98.211	D	
2011.100.60	111021.10	563.363	528.025	98.212	D	
2011.100.61	111021.11	563.304	528.673	98.211	D	1 of 2
2011.100.61	111021.11	563.304	528.673	98.211	D	2 of 2
2011.100.62	111021.12	562.457	530.335	98.208	D	
2011.100.63	111021.13	561.591	532.433	98.202	D	1of 2
2011.100.63	111021.13	561.591	532.433	98.202	D	2 of 2
2011.100.64	111021.14	560.972	532.486	98.165	U	
2011.100.66	111021.16	560.406	532.325	98.160	D	
2011.100.67	111021.17	567.146	540.463	98.423	D	
2011.100.68	111021.18	577.307	537.178	98.341	D	
2011.100.69	111021.19	585.803	544.445	98.356	D	
2011.100.70	111021.20	584.353	543.463	98.344	D	
2011.100.71	111021.21	578.032	549.555	98.582	D	
2011.100.72	111021.22	578.331	549.982	98.606	D	
2011.100.73	111021.23	576.661	550.052	98.546	U	
2011.100.74	111021.24	576.480	550.288	98.559	D	
2011.100.75	111021.25	573.910	553.554	98.645	U	
2011.100.76	111021.26	576.779	553.421	98.887	D	
2011.100.77	111021.27	572.426	554.313	98.483	D	
2011.100.78	111021.28	572.214	555.783	98.473	D	
2011.100.79	111021.29	584.679	560.432	98.274	D	(13)
2011.100.80	111021.30	582.737	559.228	98.384	D	
2011.100.81	111021.31	581.890	560.044	98.171	D	
2011.100.82	111021.32	581.015	552.049	98.781	D	

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
2011.100.83	111021.33	588.146	556.985	98.548	U	
2011.100.84	111021.34	589.234	556.484	98.526	D	
2011.100.85	111021.35	585.375	562.441	97.922	D	
2011.100.86	111021.36	592.218	561.955	97.889	D	
2011.100.87	111021.37	599.824	558.381	98.050	D	
2011.100.88	111021.38	609.408	555.576	98.139	D	
2011.100.89	111021.39	611.214	556.754	97.920	D	
2011.100.90	111021.40	615.539	555.857	98.223	U	
2011.100.91	111021.41	618.457	556.755	97.964	D	
2011.100.92	111021.42	620.643	562.632	97.350	U	
2011.100.93	111021.43	617.174	562.927	97.377	D	
2011.100.94	111021.44	615.737	561.366	97.488	U	
2011.100.95	111021.45	616.467	561.474	97.549	D	1 of 2
2011.100.95	111021.45	616.467	561.474	97.549	D	2 of 2
2011.100.96	111021.46	615.944	559.857	97.685	D	
2011.100.97	111021.47	600.291	573.473	97.383	D	
2011.100.98	111021.48	599.342	572.246	97.322	U	
2011.100.99	111021.49	598.138	575.014	97.464	D	
2011.100.100	111021.50	602.861	575.417	97.320	D	
2011.100.101	111021.51	602.251	578.681	97.348	D	
2011.100.102	111021.52	612.451	550.787	98.310	U	
2011.100.103	111021.53	625.499	538.872	99.024	D	
2011.100.104	111021.54	624.662	539.865	98.889	U	
2011.100.105	111021.55	625.357	539.518	98.945	D	
2011.100.106	111021.56	618.976	540.413	98.796	D	
2011.100.107	111021.57	619.116	540.773	98.776	D	
2011.100.108	111021.58	612.869	542.443	98.836	D	
2011.100.109	111021.59	591.627	548.375	98.429	D	
2011.100.110	111021.60	573.066	557.228	98.480	D	
2011.100.111	111021.61	569.537	532.852	98.399	D	
2011.100.112	111021.62	555.274	531.022	98.085	D	
2011.100.113	111021.63	550.838	529.701	98.096	D	
2011.100.114	111021.64	551.079	529.548	98.091	U	
2011.100.115	111021.65	550.631	529.008	98.054	D	
2011.100.116	111021.66	551.441	530.645	98.122	D	
2011.100.117	111021.67	554.349	536.706	98.193	D	1 of 2
2011.100.117	111021.67	554.349	536.706	98.193	D	2 of 2
2011.100.118	111021.68	557.945	542.979	98.270	D	
2011.100.119	111021.69	557.807	543.613	98.305	D	
2011.100.120	111021.70	563.333	555.901	98.105	D	
2011.100.121	111021.71	600.654	473.909	97.486	D	
2011.100.122	111021.72	607.516	465.555	97.490	D	
2011.100.123	111021.73	608.929	463.538	97.473	D	

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
2011.100.124	111021.74	608.137	465.105	97.503	D	
2011.100.125	111021.75	608.188	465.767	97.528	D	
2011.100.126	111021.76	609.722	466.204	97.602	U	
2011.100.127	111021.77	610.006	471.314	97.902	D	
2011.100.128	111021.78	609.476	472.007	97.902	D	
2011.100.130	111021.80	665.456	475.727	98.410	U	(14)
2011.100.131	111021.81	665.304	476.147	98.448	D	
2011.100.132	111021.82	664.155	476.365	98.517	D	
2011.100.133	111021.83	629.108	462.406	98.035	U	
2011.100.134	111021.84	619.098	463.812	97.918	D	
2011.100.135	111021.85	619.539	463.637	97.913	?	
2011.100.136	111021.86	616.670	457.686	97.513	D	
2011.100.137	111021.87	611.058	461.754	97.465	U	
Begin Contents of Box 26942						
2011.100.139	110411.1	599.072	475.398	97.481	D	(15)
2011.100.140	110411.2	598.340	475.858	97.483	D	
2011.100.141	110411.3	585.840	474.097	97.473	U	
2011.100.142	110411.4	585.516	474.405	97.479	D	
2011.100.143	110411.5	584.126	477.075	97.464	U	1 of 2
2011.100.143	110411.5	584.126	477.075	97.464	U	2 of 2
2011.100.144	110411.6	584.338	477.314	97.474	U	
2011.100.145	110411.7	579.184	474.210	97.454	U	
2011.100.146	110411.8	573.293	472.041	97.460	D	
2011.100.147	110411.9	573.356	476.534	97.449	U	
2011.100.148	110411.10	583.919	469.057	97.447	D	
2011.100.149	110411.11	581.892	465.185	97.422	D	1 of 3
2011.100.149	110411.11	581.892	465.185	97.422	D	2 of 3
2011.100.149	110411.11	581.892	465.185	97.422	D	3 of 3
2011.100.150	110411.12	604.055	452.308	97.405	D	
2011.100.151	110411.13	607.131	437.943	97.311	D	
2011.100.152	110411.14	635.389	446.760	97.361	D	
2011.100.153	110411.15	634.900	446.154	97.353	D	
2011.100.154	110411.17	641.290	454.062	97.419	D	
2011.100.155	110411.18	641.137	454.244	97.428	D	1 of 2
2011.100.155	110411.18	641.137	454.244	97.428	U	2 of 2
2011.100.156	110411.19	641.910	455.108	97.462	D	
2011.100.157	110411.20	651.631	449.841	97.303	D	
2011.100.159	110411.22	670.906	450.527	97.269	D	(16)
2011.100.161	110411.24	670.240	447.166	97.248	D	(17)
2011.100.162	110411.25	665.596	460.745	97.362	D	
2011.100.163	110411.26	664.697	460.299	97.367	D	
2011.100.164	110411.27	648.591	460.683	97.647	D	
2011.100.165	110411.28	643.085	466.981	98.023	U	

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
2011.100.166	110411.29	641.442	466.807	97.997	D	
2011.100.167	110411.30	639.910	466.497	97.971	U	
2011.100.168	110411.31	636.439	470.947	98.229	D	
2011.100.169	110411.32	635.831	471.685	98.291	D	1 of 2
2011.100.169	110411.32	635.831	471.685	98.291	U	2 of 2
2011.100.170	110411.33	635.311	472.105	98.319	D	
2011.100.171	110411.34	635.527	472.393	98.378	D	
2011.100.172	110411.35	634.282	472.018	98.252	D	
2011.100.173	110411.36	633.697	473.042	98.304	D	
2011.100.174	110411.37	607.843	476.634	97.819	D	
2011.100.175	110411.38	607.622	475.458	97.767	D	
2011.100.176	110411.39	601.145	473.476	97.474	D	
2011.100.177	110411.40	606.798	488.830	98.335	D	
2011.100.178	110411.41	609.083	488.570	98.433	D	
2011.100.179	110411.42	586.871	509.778	98.339	D	
2011.100.180	110411.43	570.602	509.530	98.752	D	
2011.100.181	110411.44	568.804	508.000	98.751	D	
2011.100.182	110411.45	563.903	506.887	98.232	D	
2011.100.183	110411.46	563.737	506.710	98.216	D	
2011.100.184	110411.47	561.805	506.575	98.075	D	
2011.100.185	110411.48	560.933	507.291	98.019	D	
2011.100.186	110411.49	557.125	511.287	97.928	D	
2011.100.187	110411.50	557.160	511.546	97.924	D	
2011.100.188	110411.51	557.303	515.992	97.929	D	1 of 2
2011.100.188	110411.51	557.303	515.992	97.929	U	2 of 2
2011.100.189	110411.52	557.510	516.302	97.969	U	
2011.100.190	110411.53	556.707	517.022	97.957	D	
2011.100.191	110411.54	559.989	515.547	98.015	D	
2011.100.192	110411.55	559.982	516.292	97.996	U	
2011.100.193	110411.56	559.906	513.999	97.993	U	
2011.100.194	110411.57	561.982	513.258	98.044	D	
2011.100.195	110411.58	563.065	514.658	98.058	U	
2011.100.196	110411.59	563.748	514.368	98.076	U	
2011.100.197	110411.60	563.262	517.901	98.088	U	
2011.100.198	110411.61	555.727	520.196	97.974	D	1 of 2
2011.100.198	110411.61	555.727	520.196	97.974	U	2 of 2
2011.100.199	110411.62	553.961	525.079	98.011	D	1 of 2
2011.100.199	110411.62	553.961	525.079	98.011	D	2 of 2
2011.100.200	110411.63	555.184	527.244	98.046	D	
2011.100.201	110411.64	556.830	526.147	98.087	D	1 of 2
2011.100.201	110411.64	556.830	526.147	98.087	D	2 of 2
2011.100.202	110411.65	557.623	523.483	98.083	U	
2011.100.203	110411.66	559.037	520.583	98.050	D	

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
2011.100.204	110411.67	561.080	519.818	98.059	D	
2011.100.205	110411.68	562.703	521.168	98.085	D	
2011.100.206	110411.69	567.996	523.791	98.271	U	
2011.100.207	110411.70	523.744	544.315	97.736	D	
2011.100.208	110411.71	517.436	559.164	97.663	D	
2011.100.209	110411.72	528.479	564.651	97.676	D	
2011.100.210	110411.73	522.330	557.073	97.804	U	
2011.100.211	110411.74	543.841	568.559	97.520	D	(18)
2011.100.212	110411.75	544.279	568.271	97.518	D	
2011.100.213	110411.76	575.067	583.159	97.583	D	1 of 2
2011.100.213	110411.76	575.067	583.159	97.583	U	2 of 2
2011.100.214	110411.77	575.863	583.361	97.611	U	
2011.100.215	110411.78	577.473	575.801	97.381	D	
2011.100.216	110411.79	575.455	572.623	97.400	D	
2011.100.217	110411.80	608.456	555.221	98.252	D	
2011.100.219	110411.82	609.856	553.706	98.328	U	(19)
2011.100.220	110411.83	613.802	550.153	98.294	U	
2011.100.221	110411.84	619.164	541.562	98.571	D	1 of 2
2011.100.221	110411.84	619.164	541.562	98.571	D	2 of 2
2011.100.222	110411.85	613.842	540.690	98.991	D	
2011.100.223	110411.86	623.268	540.412	98.975	U	
2011.100.224	110411.87	622.424	540.597	99.020	D	
2011.100.225	110411.88	623.112	538.712	99.242	D	
2011.100.226	110411.89	624.745	537.963	99.169	U	
2011.100.227	110411.90	622.996	537.871	99.335	U	
2011.100.228	110411.91	624.214	536.192	99.283	D	
2011.100.229	110411.92	625.242	537.125	99.204	D	
2011.100.230	110411.93	633.797	534.696	99.230	D	
2011.100.232	110411.95	618.104	517.016	98.957	D	(20)
2011.100.233	110411.96	614.674	520.823	98.940	D	
2011.100.234	110411.97	611.646	521.314	98.807	U	(21)
2011.100.236	110411.99	608.958	521.810	98.606	D	1 of 2 (22)
2011.100.236	110411.99	608.958	521.810	98.606	U	2 of 2
2011.100.237	110411.100	605.927	514.220	98.552	D	
2011.100.238	110411.101	605.038	513.665	98.509	D	
2011.100.239	110411.102	608.061	510.281	98.607	D	
2011.100.240	110411.103	606.066	508.169	98.473	D	
2011.100.241	110411.104	605.819	507.779	98.477	D	
2011.100.242	110411.105	614.223	490.997	98.829	D	
2011.100.243	110411.106	614.036	490.430	98.782	D	
2011.100.244	110411.107	613.865	489.843	98.713	D	
2011.100.245	110411.108	614.976	488.752	98.758	D	
2011.100.246	110411.109	620.275	490.006	99.050	D	1 of 2

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
2011.100.246	110411.109	620.275	490.006	99.050	D	2 of 2
2011.100.247	110411.110	626.706	491.954	99.543	D	
2011.100.248	110411.111	623.819	490.892	99.232	D	1 of 2
2011.100.248	110411.111	623.819	490.892	99.232	D	2 of 2
2011.100.249	110411.112	628.232	491.723	99.559	D	
2011.100.250	110411.113	628.115	490.904	99.584	D	
2011.100.251	110411.114	633.884	489.626	99.597	D	1 of 3
2011.100.251	110411.114	633.884	489.626	99.597	D	2 of 3
2011.100.251	110411.114	633.884	489.626	99.597	U	3 of 3
2011.100.252	110411.115	646.307	492.983	99.567	U	1 of 2
2011.100.252	110411.115	646.307	492.983	99.567	U	2 of 2
2011.100.253	110411.116	634.220	558.252	97.531	D	
2011.100.254	110411.117	633.305	556.833	97.600	D	
2011.100.255	110411.118	636.574	558.696	97.587	D	
2011.100.256	110411.119	628.112	569.511	97.414	U	
2011.100.257	110411.120	627.881	569.333	97.396	D	
2011.100.258	110411.121	628.593	570.067	97.370	U	
2011.100.259	110411.122	617.509	573.337	97.275	D	1 of 2
2011.100.259	110411.122	617.509	573.337	97.275	D	2 of 2
2011.100.260	110411.123	617.427	570.078	97.055	D	
2011.100.261	110411.124	625.426	571.316	97.079	D	
2011.100.262	110411.125	621.113	564.032	97.257	D	
2011.100.263	110411.126	622.225	564.120	97.272	D	
2011.100.264	110411.127	608.688	556.683	98.043	D	
2011.100.265	110411.128	609.048	558.352	97.745	D	
2011.100.266	110411.129	606.763	558.313	97.805	D	
2011.100.267	110411.130	606.491	558.279	97.808	D	
2011.100.268	110411.131	606.578	558.625	97.757	D	
2011.100.269	110411.132	605.846	558.889	97.761	D	
2011.100.270	110411.133	606.101	559.217	97.697	D	
2011.100.271	110411.134	606.329	559.239	97.698	D	
2011.100.272	110411.135	607.086	555.749	98.284	D	
2011.100.273	110411.136	605.709	555.695	98.328	D	
2011.100.275	110411.138	603.342	558.309	97.920	D	(23)
2011.100.276	110411.139	601.757	558.483	97.997	D	
2011.100.277	110411.140	599.304	561.225	97.733	D	
2011.100.279	110411.142	597.281	561.186	97.855	D	1 of 2 (24)
2011.100.279	110411.142	597.281	561.186	97.855	U	2 of 2
2011.100.280	110411.143	595.813	562.499	97.703	D	
2011.100.281	110411.144	589.102	559.768	98.393	D	
2011.100.282	110411.145	568.631	539.277	98.441	D	
2011.100.283	110411.146	559.465	534.716	98.135	D	
2011.100.284	110411.147	552.413	528.892	98.058	D	

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
2011.100.285	110411.148	547.142	526.243	97.996	D	
2011.100.286	110411.149	545.738	525.244	97.926	D	
2011.100.287	110411.150	544.108	525.720	97.869	D	
2011.100.289	112111.1	704.441	472.885	97.142	D	(25)
2011.100.290	112111.2	701.471	473.328	97.074	D	
2011.100.291	112111.3	701.210	471.729	97.159	D	1 of 2
2011.100.291	112111.3	701.210	471.729	97.159	D	2 of 2
2011.100.292	112111.4	693.561	478.125	97.414	D	
2011.100.293	112111.5	692.204	477.054	97.470	D	
2011.100.294	112111.6	693.718	482.156	97.310	U	
2011.100.295	112111.7	695.410	483.104	97.158	D	
2011.100.296	112111.8	690.660	489.733	97.300	D	
2011.100.297	112111.9	678.318	488.058	98.330	D	
2011.100.298	112111.10	683.364	478.036	98.047	D	
2011.100.299	112111.11	677.625	495.774	98.013	D	
2011.100.300	112111.12	686.165	493.368	97.549	D	
2011.100.301	112111.13	673.373	502.696	97.828	D	
2011.100.302	112111.14	669.433	511.573	98.036	D	1 of 2
2011.100.302	112111.14	669.433	511.573	98.036	U	2 of 2
2011.100.303	112111.15	669.485	511.838	98.037	U	
2011.100.304	112111.16	669.329	512.316	98.010	D	
2011.100.305	112111.17	675.546	516.012	97.349	D	
2011.100.306	112111.18	684.553	522.470	96.870	D	
2011.100.307	112111.19	688.005	521.251	96.859	D	
2011.100.308	112111.20	696.250	525.611	96.845	D	
2011.100.309	111121.40	668.403	518.658	97.702	D	
2011.100.310	111121.41	670.016	518.477	97.740	D	
2011.100.311	111121.42	658.605	525.074	98.204	D	
2011.100.312	111121.43	600.908	525.161	97.728	D	
2011.100.312	111121.43	600.908	525.161	97.728	D	
2011.100.313	111121.44	660.018	526.945	97.800	D	
2011.100.314	111121.45	655.114	532.642	97.822	D	
2011.100.315	111121.46	661.312	535.556	97.426	D	
2011.100.316	111121.47	660.493	533.869	97.431	D	
2011.100.317	111121.48	669.724	541.830	97.124	U	
2011.100.318	111121.49	670.909	540.681	97.085	D	
2011.100.319	111121.50	664.832	547.402	97.181	D	
2011.100.320	111121.51	662.015	544.487	97.353	D	
2011.100.321	111121.52	657.839	546.472	97.229	D	
2011.100.322	111121.53	651.027	531.676	98.470	D	
2011.100.323	111121.54	674.217	532.812	96.950	D	
2011.100.324	111121.55	679.902	532.138	96.904	D	
2011.100.325	111121.56	680.802	530.969	96.899	D	

Table B.1. Individually Collected Hopi Sherds.

Catalogue No.	Total Station Shot No.	Easting	Northing	Vertical	D/U	Details/ Comments
2011.100.326	111121.57	690.372	528.911	96.867	D	
2011.100.327	111121.58	674.506	526.633	97.291	D	
2011.100.328	111121.59	628.611	529.909	99.321	D	
2011.100.329	111211.60	657.865	487.742	99.518	D	
2011.100.330	111121.61	658.067	485.572	99.310	D	

Details and comments : (1) Sherd recently broken into 3 conjoining pieces. (2) No surfaces left; “D’ based on paste. (3) Two conjoining pieces. (4) No Catalogue No. 2010.55.26; 2010.55.27 not a Hopi sherd? (5) 2010.55.37 is a Rio Grande Glaze Ware sherd with a creamy yellow surface, collected by mistake. (6) 2010.55.39 is shell pendant. (7) 2010.55.48 is a Rio Grande Glaze Ware sherd collected for the site-specific type collection. (8) Total Station Shot 22 for the day not for a collection item. (9) 2010.57.90 not a Hopi sherd. (10) 2010.57.97 probably not a Hopi sherd. (11) 2010.57.99a is a turquoise bead. (12) No shot 48. (13) Two conjoining pieces. (14) 2011.100.129 is a *Pecten* pendant. (15) 2011.100.138 is 16 sherds from the west bulldozer push pile (of the South Bulldozer Trench), gathered for type collections. (16) 2011.100.158 not a Hopi sherd. (17) 2011.100.160 not a Hopi sherd. (18) Stirrup spout fragment. (19) 2011.100.218 not a Hopi sherd. (20) 2011.100.231 not a Hopi sherd. (21) Two conjoining pieces. (22) 2011.100.235 not a Hopi sherd. (23) 2011.100.274 not a Hopi sherd. (24) 2011.100.278 not a Hopi sherd. (25) 2011.100.288 not a Hopi sherd. (26) 2011.100.331–.333 were grab samples of out-of-context sherds, for type collections.

Table B.2. Spatial Distribution of Individually Collected Hopi Sherds.
(25 by 25 m squares within the site grid)

	E 500–525	E 525–550	E 550–575	E 575–600	E 600–625	E 625–650	E 650–675	E 675–700	E700–725	Total
All Classified Hopi Sherds										
N 575–600				5	2					7
N 550–575	2	8	17	20	34	7				88
N 525–550	1	13	30	7	16	8	21	7		103
N 500–525		7	32	8	20	14	18	5		104
N 475–500			6	37	35	24	17	18	1	138
N 450–475			1	7	16	16	3	15	14	72
N 425–450					1	2	2			5
Total	3	28	86	84	124	71	61	45	15	517
Hopi Decorated Sherds										
N 575–600				3	2					5
N 550–575	1	7	14	15	26	5				68
N 525–550	1	11	28	7	12	7	19	7		92
N 500–525		4	21	7	17	9	14	5		77
N 475–500			1	10	23	16	9	15	1	75
N 450–475			1	5	14	11	3	15	13	62
N 425–450					1	2	2			5
Total	2	22	65	47	95	50	47	42	14	384
Hopi Utility Sherds										
N 575–600				2						2
N 550–575	1	1	3	5	8	2				20
N 525–550		2	2		4	1	2			11
N 500–525		3	11	1	3	5	4			27
N 475–500			5	27	12	8	8	3		63
N 450–475				2	2	5			1	10
N 425–450										0
Total	1	6	21	37	29	21	14	3	1	133

This approach is inappropriate for predicting the sherd density of single virtual squares, when population density is known to be as variable as it is at Pottery Mound, but statistical smoothing will occur over multiple sample points. The division of the site surface into just four areas (quadrants) helps ensure that the smoothing effect is maximized. Some readers may recognize the approach being used as a variation on quadrat sampling in biology, based on systematic rather than random sampling.

Each quadrant was then assigned its corresponding virtual squares, each square with its projected density of sherds. For Franklin sample units on the E650 or N500 lines, half of the corresponding virtual square was assigned to each adjacent quadrant. At E650, N500, one-quarter of the corresponding virtual square was assigned to each of the four site quadrants. The result was estimates of the area (based on the virtual squares) and number of sherds for each quadrant. The actual size of each quadrant was then determined from the site map, and the estimated number of sherds per quadrant was adjusted by a correction factor (Table B.3).

Table B.3. Projected Sherd Counts and Densities per Site Quadrant.

	NW	NE	SE	SW	Site
No. of 1 by 1 m units (1)	26	10	12	11	59
No. of sherds in 1 by 1 m units (2)	942	603	481	449	2475
Mean density per sample unit	40.96	60.3	40.08	40.82	41.95
Area of in m^2, based on virtual squares	13906.25	4218.75	5468.75	4531.25	28125
Area in m^2, based on site map	13768	4106	5069	4551	27494
Adjustment factor (3)	0.9901	0.9733	0.9269	1.0044	0.9776
Initial estimate of surface sherds (4)	565625	331563	210000	212188	1319376
Estimate after adjustment factor	560002	322701	194650	213112	1290465
Final estimated density per m2 (5)	40.67	78.59	38.40	46.83	46.91

1) Including units within the site that did not yield sherds.
2) Sherds along the E650 and N500 lines were considered for both adjacent quadrants, so the row total is greater than 2111 (the actual count for Franklin's sample of 1 by 1 m^2 units.
3) Area based on site map, divided by the area based on the virtual squares.
4) Projected sherd count per virtual square (or the portion of the square falling within the quadrant).
5) Revised estimated number of sherds per quadrant, divided by map-based area of quadrant. The NE quadrant density is greater because the low-density fringe of that part of the site was removed by the Rio Puerco.

The protocol generated some data of general interest. The surface assemblage is estimated to include roughly 1.3 million potsherds, even after years of authorized and unauthorized surface collecting. The name "Pottery Mound" is well deserved! In three of the four quadrants the average density is between 38 and 47 sherds per square meter. The average density in the northeast quadrant of the site is much higher, because in that quadrant the Rio Puerco has chewed away the low-density fringe of the site. The real purpose of Table B.3, however, is to allow us to evaluate the distribution of Hopi sherds across the site, relative to sherds in general (Table B.4).

Table B.4. Distribution of Sherds by Site Quadrant.

	W of 650		E of 650		Total	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**
All Sherds (per estimates in Table B.3)						
N of 500	560002	43.4%	322701	25.0%	882703	68.4%
S of 500	213112	16.5%	194650	15.1%	407762	31.6%
Total	773114	59.9%	517351	40.1%	1290465	100.0%
Individually Collected Hopi Sherds						
N of 500	251	48.5%	51	9.9%	302	58.4%
S of 500	145	28.0%	70	13.5%	215	41.6%
Total	396	76.6%	121	23.4%	517	100.0%
Hopi Utility Ware Sherds						
N of 500	54	40.6%	6	4.5%	60	45.1%
S of 500	61	45.9%	12	9.0%	73	54.9%
Total	115	86.5%	18	13.5%	133	100.0%
Hopi Decorated Ware Sherds						
N of 500	197	51.3%	45	11.7%	242	63.0%
S of 500	84	21.9%	58	15.1%	142	37.0%
Total	281	73.2%	103	26.8%	384	100.0%

With Table B.4 in place, it is possible to compare the distribution of Hopi sherds on the site surface with the distribution of sherds in general. In the northwest and southeast quadrants of the site, the distribution of Hopi sherds roughly matches the estimated distribution of sherds in general. In the northeast quadrant of the site, Hopi sherds are rarer than might be expected; 10 percent of the Hopi sherds were found there, as opposed to 25 percent of sherds in general. In the southwest quadrant of the site, Hopi sherds are more common than might be expected; 28 percent f the Hopi sherds were found there, as opposed to 17 percent of sherds in general.

When the site is divided into halves, Hopi sherds are more common in the west half of the site than sherds in general (77 percent versus 60 percent), and more common in the south half of the site than sherds in general (42 percent versus 32 percent).

In the northwest quadrant of the site, Hopi decorated sherds are slightly more common than sherds in general (51 percent versus 43 percent). The same holds true for the southwest quadrant of the site (22 percent of the Hopi decorated sherds were found there, as opposed to 17 percent of all sherds). In the northeast quadrant of the site Hopi decorated sherds are much less common than sherds in general (12 percent versus 25 percent). In the southeast corner of the site, Hopi decorated sherds are as common as sherds in general (15 percent in both cases). Decorated Hopi sherds are more common in the west half of the site than sherds in general (73 percent versus 60 percent) and slightly more common in the south half of the site than sherds in general (37 percent versus 32 percent). Given that three-quarters of the individually collected Hopi sherds are from

decorated vessels, the broad similarities between the pattern for Hopi sherds in general and for Hopi decorated ware sherds are not surprising.

In the northwest quadrant of the site, Hopi utility sherds are about as common as sherds in general. In the southeast quadrant of the site, Hopi utility sherds are less common than sherds in general (9 percent versus 15 percent) and in the northeast quadrant of the site, Hopi utility sherds are also less common than sherds in general (9 percent versus 15 percent). In the southwest quadrant of the site, Hopi utility sherds are much more common than sherds in general; close to half of the individually collected utility sherds were found there (46 percent, versus 17 percent for sherds in general).

When the Hopi decorated ware and utility ware sherds are compared, additional differences are apparent. Hopi decorated ware sherds are relatively more common than utility ware sherds in the northwest quadrant (51 percent versus 41 percent), northeast quadrant (12 percent versus 5 percent), and southeast quadrant (15 percent versus 9 percent). Hopi utility ware sherds are relatively much more common than Hopi decorated ware sherds in the southwest quadrant (46 percent versus 22 percent).

Table B.5 provides Chi-square tests for the distributions just summarized. In the first three tests, the null hypothesis is that the distribution of Hopi sherds does not differ from the distribution of sherds in general. The expected values are based on the samples having the same relative distribution as sherds in general. As one example, since 43.4 percent of the sherds in general occur in the northwest quadrant, if the Hopi sherds do not have a different distribution, we should expect about 43.4 percent of the 517 Hopi sherds to be from the northwest quadrant. Thus the expected value for Hopi sherds in general, in the northwest quadrant, is 0.434 times 517, or 224.378 sherds. In the last test, the null hypothesis is that the distribution of Hopi utility sherds does not differ from that of Hopi decorated sherds. Thus, for example, because 51.3 percent of the Hopi decorated ware sherds were found in the northwest quadrant, we would expect about 51.3 percent of the Hopi utility ware sherds to be from there as well. The expected value for Hopi utility ware sherds in the northwest quadrant is thus 0.513 times 133, or 68.229. For each of the tests, the probability of the differences being due to chance alone is less than 0.001.

In summary, the Hopi sherds on the surface of Pottery Mound appear to be distributed differently than sherds in general. The Hopi sherds tend to be more common as one moves west and south across the site. Moreover, Hopi utility sherds appear to be distributed differently than Hopi decorated sherds, being highly concentrated in the southwest quadrant of the site. We will explore the behavioral implications of this pattern in a separate publication. Meanwhile, if anyone objects to our methods or conclusions regarding the Hopi surface sherds, the level of detail contained in this report should make it possible to construct an alternative approach.

Table B.5. Chi-square Tests on the Distribution of Hopi Sherds.

	W of 650	E of 650	Total
OBSERVED	*All Hopi sherds*		
N of 500	251	51	302
S of 500	145	70	215
Total	396	121	517
EXPECTED	*If same as all sherds*		
N of 500	224.378	129.25	353.628
S of 500	85.305	78.067	163.372
Total	309.683	207.317	517
Chi-square (Yates) = 91.622			
OBSERVED	*All Hopi decorated ware sherds*		
N of 500	197	45	242
S of 500	84	58	142
Total	281	103	384
EXPECTED	*If same as all sherds*		
N of 500	166.656	96	262.656
S of 500	63.36	57.984	121.344
Total	230.016	153.984	384
Chi-square (Yates) = 38.315			
OBSERVED	*All Hopi utility ware sherds*		
N of 500	54	6	60
S of 500	61	12	73
Total	115	18	133
EXPECTED	*If same as all sherds*		
N of 500	57.722	33.25	90.972
S of 500	21.945	20.083	42.028
Total	79.667	53.333	133
Chi-square (Yates) = 92.301			
OBSERVED	*All Hopi utility ware sherds*		
N of 500	54	6	60
S of 500	61	12	73
Total	115	18	133
EXPECTED	*If same as all Hopi decorated ware sherds*		
N of 500	68.229	15.561	83.79
S of 500	29.127	20.083	49.21
Total	97.356	35.644	133
Chi-square (Yates) = 92.694			

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Appendix C

POTTERY ANALYSIS CODES FOR POTTERY MOUND

(Version of May 1, 2005, as modified for surface collection study in June 2012. All sherds over 1 by 1 cm were analyzed and counted.)

MATTE PAINTED TYPES

9 plain white, series unknown
10 Red Mesa Black-on-white
11 Puerco-Escavada Black-on-white
12 Socorro Black-on-white
13 Chupadero Black-on-white
15 Santa Fe Black-on-white
20 Wiyo Black-on-white
25 Biscuit A (Abiquiu Black-on-gray)
30 Biscuit B (Bandelier Black-on-gray)
50 St. Johns Polychrome
55 Heshotauthla Polychrome (light glazed black paint, sherd temper)
70 Historic Tewa black-on-cream
71 Sankawi Black-on-cream
83 Red-on-tan (see also Code 130)

RIO GRANDE GLAZE WARE, BODY SHERDS (no rims)

no paint

91 exterior red, interior red or orange (probably Agua Fria or Largo G/R)
93 (including code 92) red interior, white exterior or vice-versa (prob. San Clemente)
96 exterior red, interior orange or olive (prob. Agua Fria G/R or Pottery Mound Poly.)

with glaze paint

97 red, orange slip with black glaze paint
98 red slip on one side, yellow/white slip on the other side, with black glaze paint
99 polychrome with black glaze paint

GLAZE A (using Mera rim shape classes)

Rim sherds identifiable to specific type

100 Glaze A, not further specified
101 Los Padillas Poly. (white exterior paint; interior has black glaze paint on red slip; basically Heshotauthla Poly. made along on the Rio Grande.
105 Arenal Poly. (same as Los Padillas Poly., but white paint enters black painted areas? Rock temper if made along the Rio Grande)
110 Agua Fria Glaze-on-red (black glaze paint on red slip)

GLAZE A, ***continued***

111 Agua Fria Glaze-on-red with light red or orange interior slip
112 Agua Fria Poly. (white filler added to Agua Fria Glaze/red; same as Arenal Glaze Poly.?)
115 San Clemente Poly. (red ext.; chalky white int. with black glaze paint)
116 San Clemente Poly. (red ext.; creamy yellow int. with black glaze paint)
117 San Clemente Poly. (chalky white slip ext.; red slip int.; jars white slip ext. only)
118 San Clemente Poly. (creamy yellow slip ext.; red slip int.; jars white slip ext. only)
119 San Clemente Poly. (white or creamy slip on both sides of bowl)

San Clemente counts were combined into one code (116) for the surface project. The final counts included:

120 Cieneguilla Glaze-on-yellow (black glaze paint on yellow slip int. and ext. on bowls)

121 Cieneguilla Poly. (red matte filler with black paint on yellow ground) *(This type may not be distinguishable from San Clemente in jar form. Also, the Poly. variant results in many glaze-on-yellow body sherds. Overlaps in definition with Pottery Mound Poly. (yellow slip variety) Only intrusive polychromes were placed in this category).*

125 Pottery Mound Poly. (generic; for the surface project this includes old Codes 126, 127, and 130.) *(Black paint around red designs on an orange, buff or olive background; Glaze A or Glaze C rim. Voll includes white slip and cream slip varieties, coded below. Is the white slip variety not Cieneguilla Glaze Poly.? This is a tight category. It is recognized securely only when free-standing red paint occurs on the same surface with black paint over a red or orange-buff -white slip. Many sherds without red paint may be classed as Agua Fria (Code 110 or 111) or as unpainted body sherds (Codes 91 or 96, above), so probably this type is underrepresented in the tabulations.)*

GLAZE B (virtually nonexistent at Pottery Mound as an indigenous type)

200 Glaze B (rim sherd but not further specified)
201 Largo Glaze-on-yellow
205 Largo Glaze-on-red
210 Largo Poly. (Medio Poly.)

GLAZE C

300 Glaze C (rim but not further specified)
301 Espinosa Poly. (this category used only for intrusive Glaze C, rare)
302 Kuaua Poly. (This is best seen as a late variant of San Clemente, with incurved and beveled rims on bowls. Decoration on exterior only. In practice, some were classed as San Clemente Codes 115–119 codes with bowl rim = 9.)
350 unidentified Intermediate Rio Grande glaze

GLAZE D

400 Glaze D: (rim but not further specified)
401 San Lazaro Poly. (Thickened and elongated rims often S shaped. Red matte paint enclosed by black glaze paint, against an orange or fawn-buff slip.)

GLAZE E (not found at Pottery Mound)

500 Glaze E (rim but not further specified)
501 Puaray Poly. (Encierro Poly., Escondido Poly., Masada Poly.)
510 Pecos Poly.

GLAZE F (not found at Pottery Mound)

600 Glaze F (rim but not further specified)
601 Kotyiti Poly.
610 Kotyiti Glaze-on-yellow (Lemitar Glaze-on-yellow)
615 Kotyiti Glaze-on-red
620 Trenaquel Poly. (Polvadera Poly.)

UTILITY (UNPAINTED) WARE

701 Clapboard Corrugated (including Corona Smeared-Indented)
705 Indented Corrugated (indentations without wiping or smearing)
706 Obliterated Corrugated (can still see coil joints but those are wiped over, smeared)
710 Plain Gray (no mica or micaceous paste)
725 Los Lunas Smudged
726 Pitoche rubbed ribbed
730 Sapawe Micaceous Washboard
735 Punctate
740 Cibola-Acoma plain utility (white paste with potsherd or red basalt temper)
741 Cibola-Acoma corrugated utility (white paste with potsherd or red basalt temper)
799 unknown plain utility

ACOMA, ZUNI PAINTED

805 Gallup Black-on-white
810 Kwakina Glazed Poly. (Zuni)
820 Pinnawa Glaze-on-white
821 Kechipawan Glaze Poly.
830 Acoma-Zuni glaze ware, not further specified
831 unpainted portions of Acoma-Zuni glaze ware vessels

HOPI PAINTED AND UTILITY

850 Jeddito Black-on-yellow
860 Sikyatki Poly.
870 Generic Hopi yellow (not specified further)
880 Hopi utility plain ware (same fine yellow paste as Hopi decorated sherds)
881 Hopi utility, corrugated
885 Hopi or Acoma plain utility ware, not specified further
886 Hopi or Acoma corrugated, not specified further

MISCELLANEOUS TYPES

999 unknown type or clay materials

VESSEL FORM CODES

1 jar (all plain utility body sherds are given this code; you can't tell the jars from the bowls unless you have a rim. Rim sherds are separated into jars and bowls.)
2 bowl
3 figurine (effigy)
4 ladle
5 soup plate with flare rim
6 seed jar
7 pipe
8 drilled disk
9 unknown
10 test pot
11 raw (unfired) clay
12 cylindrical jar

VESSEL PART CODES

1 body
2 rim
3 handle
4 lug
9 unknown or raw clay
11 raw clay (unfired)

TEMPER CODES

1 potsherd
2 black or gray vesicular basalt (combined with Code 4 during this project)
3 red vesicular basalt (combined with Code 4 during this project)
4 black and/or red basalt (vesicular or dense ophitic)
5 vitrophere (shiny black) (combined with Code 4 during this project)
6 quartz sand
7 sandstone (combined with Code 6 during this project)
8 intermediate igneous rock (originally andesite, diorite, but probably diabase basalt)
9 latite fine grained porphyry with olivine? (poikilitic texture) (intrusive?)
10 schist (not large flakes of mica)
11 mica (muscovite or biotite) (combined with Code 10 during this project)
12 fine-grained gray rock (diabase?) (combined with Code 4 during this project)
13 white inclusions (potsherd or calcium carbonate) (usually found with basalt)
14 tuff
99 unknown or none

RIM SHAPE CODES

1 straight, round lip
2 straight, flattened lip
3 straight, angled (beveled) lip
4 outcurving, round lip
5 outcurving, flattened lip
6 outcurving, angled (beveled or tang) lip
7 incurving, round lip
8 incurving, flattened lip
9 incurving, angled (beveled) lip (typical for Kuaua Glaze Poly.)
10 straight, thickened, round lip (Glaze B?)
11 straight, thickened, flat lip (Glaze B?)
12 elongated and thickened (Glaze D)

RIM DIAMETERS

Measure to closest cm on rim board. Done on all rim sherds with at least 20 degrees of arc. Left blank when degrees of arc are less than 20.

RIM DEGREES OF ARC

In degrees, measured on board. Done on all sherds with at least 20 degrees of arc. Smaller sherds are not given rim diameters, and assigned 8 degrees of arc as an average reading.

COMMENTS

1 good for photo
2 smudged surfaces
3 drill holes
4 worked edges
5 pulled for temper
6 unfired
7 pulled for special type collection (study or photo later; only code used consistently)
8 light yellow or buff paste

COUNT

Frequency of sherds with this combination of attributes within the bag. Includes any sherds pulled for further study

Appendix D

SURFACE SAMPLE ANALYSIS FORM

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Pottery Mound Systematic Surface Sample Collection (Franklin and Phillips)

Phase 1: single squares test

Square	Grid	Type	Temper	Vessel form	Vessel part	Frequency

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